

# **The American School and University**

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A YEARBOOK DEVOTED TO THE DESIGN, CONSTRUCTION,  
EQUIPMENT, UTILIZATION, AND MAINTENANCE OF  
EDUCATIONAL BUILDINGS AND GROUNDS

1950-51

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Laboratory Furniture Company, Inc. . . . .	762, 763
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Graybar Electric Co., Inc. ....	613
International Business Machines Corp. ....	614, 649
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Hercules Food Service Equipment, Inc. ....	698
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General Electric Co. ....	777-783
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Durant Insulated Pipe Co. ....	581
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Leeds & Northrup Co. ....	764, 765
Westinghouse Electric Corp. ....	768-771

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Cleveland Range Co. ....	709
Duke Mfg. Co. ....	710
General Electric Co. ....	731-742
Hercules Food Service, Equipment, Inc. ..	698
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Northwest Studios, Inc. ....	685
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Kearney & Trecker Corp. .... 899-902  
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Diebold, Inc. .... 668, 669  
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 General Floorcraft, Inc. .... 856  
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**Furnaces, Electric Heat-Treating**

General Electric Co. ....777-783

Harper Electric Furnace Corp. .... 785

Pereny Equipment Co. .... 786

**Furniture, Cafeteria**

Howe Folding Furniture, Inc. .... 646

Schieber Manufacturing Co. ....522, 523

Straus-Duparquet, Inc. .... 712

Universal Equipment Co. .... 723

**Furniture, Dormitory**

Carrom Industries, Inc. .... 718

National Store Fixture Co. ....719-722

Simmons Co. ....724, 725

Straus-Duparquet, Inc. .... 712

Superior Sleeprite Corp. ....726, 727

Universal Equipment Co. .... 723

**Furniture, Home Economics (see  
Homemaking Furniture and  
Equipment)****Furniture, Laboratory (see Laboratory  
Furniture & Supplies)****Furniture, Office & Library**

All-Steel Equipment Inc. .... 672

American Seating Co. ....639-642

Art Metal Construction Co. ....659-666

Berger Mfg. Div., Republic Steel Corp. .. 813

Diebold, Inc. ....668, 669

Globe-Wernicke Co. ....670, 671

Irwin Seating Co. .... 622

Kewaunee Mfg. Co. ....728, 729

Metal Office Furniture Co. .... 673

National Store Fixture Co. ....719-722

Norcor Manufacturing Company .... 644

Remington Rand Inc. ....653-657

Snead &amp; Co. .... 658

Universal Equipment Company .... 723

**Furniture, Shop**

Aurora Steel Products Company .... 812

Berger Mfg. Div., Republic Steel Corp. .. 813

Interior Steel Equipment Co. .... 814

Kewaunee Mfg. Co. ....728, 729

Lyon Metal Products, Inc. ....816, 817

Standard Pressed Steel Co. .... 787

Standard Steel Equipment Co., Inc. .... 815

Universal Steel Equipment Corp. .... 667

**Furniture Casters, Cups & Glides**

Faultless Caster Corp. .... 690A

**Fuses**

Graybar Electric Co., Inc. .... 613

**Gages**

Brown &amp; Sharpe Mfg. Co. ....790, 801

Leeds &amp; Northrup Co. ....764, 765

Lufkin Rule Co. .... 792

Millers Falls Co. .... 793

Starrett Co. .... 795

Westinghouse Electric Corp. ....768-771

Weston Electrical Instrument Corp. ....773-776

**Galvanometers & Dynanometers**

General Electric Co. ....777-783

Leeds &amp; Northrup Co. ....764, 765

Westinghouse Electric Corp. ....768-771

Weston Electrical Instrument Corp. ....773-776

**Garbage & Waste Disposal Units**

General Electric Co. ....731-742

Sargent Building Specialties Co. .... 583

Washburn &amp; Granger, Inc. .... 584

**Gas Ovens and Ranges**

Blodgett Co., Inc. .... 708

Van Range Co. .... 713

**Gates, Iron & Wire**

Anchor Post Products, Inc. .... 874

Colorado Fuel &amp; Iron Corp., Wickwire

Spencer Steel Div. .... 875

Continental Steel Corp. .... 876

Cornell Iron Works, Inc. .... 461

Kinnear Mfg. Co. .... 462

Pittsburgh Steel Co. .... 878

Stewart Iron Works Co. .... 879

**Generators**

General Electric Co. ....777-783

Westinghouse Electric Corp. ....768-771

**Germicidal Lamp Fixtures**

Graybar Electric Co., Inc. .... 613

**Glass, Plate**

Libbey-Owens-Ford Glass Co. .... 448

**Glass, Structural**

Libbey-Owens-Ford Glass Co. .... 448

Lord &amp; Burnham ..... 883

Pittsburgh Corning Corp. ....446, 447

**Glass Block for Windows and Walls**

American Structural Products Co. .... 445

American 3 Way-Luxfer Prism Co. ....571-578

Pittsburgh Corning Corp. ....446, 447

**Glassware, Laboratory**

Corning Glass Works ..... 748

**Glassware, Lighting (see Globes &  
Glassware, Lighting)****Glassware, Table**

Straus-Duparquet, Inc. .... 712

**Glazed Tile**

Mosaic Tile Company ....469-472

National Fireproofing Corp. .... 473

United States Quarry Tile Co. .... 474

**Glides, Chair**

Faultless Caster Corp. .... 690A

**Globes & Glassware, Lighting**

Curtis Lighting, Inc. ....592, 593

Guth Co. .... 595

Holophane Co. ....596, 597

Wakefield Brass Co. ....600, 601

**Gongs, Fire Alarm**

International Business Machines Corp. 614; 649

Standard Electric Time Co. ....607-610

**Grandstands**

Hussey Mfg. Co., Inc. .... 830

Leavitt Corp. ....828, 829

Long Island Bleacher Co., Inc. .... 825

Pittsburgh-Des Moines Steel Co. .... 831

Queensboro Steel Corp. .... 832

Republic Structural Iron Works .... 833

Safway Steel Products, Inc. .... 836

Timber Structures, Inc. ....413-416

Universal Bleacher Co. .... 837

Wayne Iron Works ....838, 839

**Greenhouses**

Lord and Burnham ..... 883

**Grilles, Metal Rolling and Radiator**

Cornell Iron Works, Inc. .... 461

Kinnear Mfg. Co. .... 462

Michaels Art Bronze Co., Inc. .... 467

**Grills & Griddles, Electric**

General Electric Co. ....731-742

Hotpoint, Inc. ....699-702

**Grinders, Bench**

Atlas Press Co. .... 784

Black &amp; Decker Mfg. Co. .... 796

Millers Falls Co. .... 793

Modern Manufacturing Company .... 870

Porter-Cable Machine Co. ....797; 859

SkilSaw, Inc. .... 798

Stanley Electric Tools .... 799

Walker Turner Div., Kearney &amp; Trecker

Corp. ....804, 805

**Grinding Tools & Machines**

Atlas Press Co. .... 784

Black &amp; Decker Mfg. Co. .... 796

Brown &amp; Sharpe Mfg. Co. ....790; 801

Cincinnati Milling Machine Co., Cincinnati

Grinders, Inc. .... 903

Kearney &amp; Trecker Corp. ....899-902

Millers Falls Co. .... 793

Porter-Cable Machine Co. ....797; 859

SkilSaw, Inc. .... 798

Stanley Electric Tools .... 799

Walker Turner Div., Kearney &amp; Trecker

Corp. ....804, 805

**Groceries**

Sexton &amp; Co. ....694, 695

**Grooving & Channeling for Safety  
Treads, Drainage, etc.**

Cutcrete Corporation ..... 820

**Guards, Window (see Window Guards,  
Iron & Wire Mesh)****Gymnasium Equipment**

American Playground Device Co. ....842, 843

Burke Co., J. E. .... 844

General Playground Equipment Inc. .... 845

Medart Products, Inc. ....834, 835

Recreation Equipment Co. .... 846

**Gymnasium Floor Maintenance**

American Floor Surfacing Machine Co. .. 848

Breuer Electric Mfg. Co. .... 849

Clarke Sanding Machine Co. .... 850

Consolidated Laboratories .... 851

Empire Varnish Co. .... 852

Hillyard Sales Companies ....854, 855

West Disinfecting Co. .... 860

**Gymnasium Flooring**

Jennison-Wright Corporation ....481-484

Johns-Manville .....542, 543

Kennedy, Inc., David E. ....485-488

Maple Flooring Manufacturers Assn. .. 489

Moulding Floor Mfg. Co. ....490, 491

Storm Flooring Co. ....498, 499

Tile-Tex Co., Inc. ....475-478

**Gymnasium Lighting (see Lighting  
Equipment & Supplies)****Gymnasium Lockers (see Lockers,  
Steel)**

**Gymnasium Seating**

Horn Brothers Co. ....	826, 827
Hussey Mfg. Co., Inc. ....	830
Leavitt Corp. ....	828, 829
Long Island Bleacher Co., Inc. ....	825
Medart Products, Inc. ....	834, 835
Queensboro Steel Corp. ....	832
Republic Structural Iron Works ....	833
Safway Steel Products, Inc. ....	836
Timber Structures, Inc. ....	413-416
Universal Bleacher Co. ....	837
Wayne Iron Works ....	838, 839

**Hack Saws (see Saws)****Hammers**

Millers Falls Co. ....	793
Stanley Tools ....	794

**Hammers, Portable Electric**

Black & Decker Mfg. Co. ....	796
Millers Falls Co. ....	793

**Hand Tools (see Tools, Hand)****Hangers, Lighting Fixture**

Thompson Electric Co. ....	611
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**Hangers, Uniform**

American Playground Device Co. ....	842, 843
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**Hearing Aids**

Graybar Electric Co., Inc. ....	613
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**Heat Treating Furnaces (see Furnaces, Electric Heat Treating)****Heating & Ventilating Equipment**

American 3 Way-Luxfer Prism Co. ....	571-578
Crane Co. ....	587
Gannon Co. ....	545
International Boiler Works Co. ....	548
Johnson Service Co. ....	568
Nash Engineering Co. ....	561
Nelson Corp., Herman ....	562
Nesbitt, Inc. ....	557-560
Petroleum Heat & Power Co. ....	546, 547
Shaw-Perkins Mfg. Co. ....	569, 570
Smith Co., Inc., H. B. ....	549-556
Trane Company ....	564, 565
Vulcan Radiator Co. ....	563
Warren Webster & Co. ....	566, 567

**Hedge Trimmers, Electric (see Lawn Mowers & Trimmers, Hand & Machine)****Herbarium Cases**

Art Metal Construction Co. ....	659-666
Interior Steel Equipment Co. ....	814
Lane Co., Chas. J. ....	675

**Hinged Lighting Fixtures**

Edwin F. Guth Company ....	595
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**Hinges & Latches**

Stanley Works ....	526
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**Homemaking Furniture & Equipment**

Bavinco Mfg. Corp. ....	730
Boonton Molding Company ....	691
General Electric Co. ....	731-742
Kewaunee Mfg. Co. ....	728, 729
Keyes Fibre Co. ....	692
Lyon Metal Products, Inc. ....	816-817
Mutschler Brothers Co. ....	703-706
Singer Sewing Machine Co. ....	744
Wood Metal Industries ....	743

**Honor Rolls**

International Bronze Tablet Co., Inc. ....	464
Matthews & Co., Jas. J. ....	465

Michaels Art Bronze Co., Inc. ....	467
McGann & Sons Co. ....	466
Stewart Iron Works, Inc. ....	879

**Hospital Equipment (see Infirmary Furniture and Supplies)****Hotplates**

Hotpoint, Inc. ....	699-702
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**Hot Water Supply (see Boilers)****Humidity Control Systems**

Johnson Service Co. ....	568
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**Hypochlorite**

American Playground Device Co. ....	842, 843
Mathieson Chemical Corp. ....	823

**Illumination Control**

American 3 Way-Luxfer Prism Co. ....	571-578
Benjamin Electric Mfg. Co. ....	590, 591
Crouse-Hinds Co. ....	840
Electric Storage Battery Co. ....	612
General Electric Co. ....	841
Holophane Co., Inc. ....	596, 597

**Incinerators**

Sargent Building Specialties Co. ....	583
Washburn & Granger, Inc. ....	584

**Indices and Card Index Systems**

Art Metal Construction Co. ....	659-666
Diebold, Inc. ....	668, 669
Globe-Wernicke Co. ....	670-671
International Business Machines Corp. ....	614, 649
Remington Rand Inc. ....	653-657

**Inductors**

Leeds & Northrup Co. ....	764, 765
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**Infirmary Furniture & Equipment**

Carrom Industries, Inc. ....	718
Corning Glass Works ....	748
Laboratory Furniture Co., Inc. ....	762, 763
National Store Fixture Co. ....	719-722
Simmons Co. ....	724, 725
Straus-Duparquet, Inc. ....	712
Superior Sleeprite Corp. ....	726, 727
Universal Equipment Co. ....	723

**Insecticides**

Consolidated Laboratories ....	851
Hillyard Sales Companies ....	854, 855
West Disinfecting Co. ....	860

**Instruments, Electrical**

General Electric Co. ....	777-783
General Radio Co. ....	772
Klett Manufacturing Co. ....	760, 761
Leeds & Northrup Co. ....	764, 765
Westinghouse Electric Corp. ....	768-771
Weston Electrical Instrument Corp. ....	773-776

**Instruments, Switchboard**

General Electric Co. ....	777-783
Standard Electric Time Co. ....	607-610
Westinghouse Electric Corp. ....	768-771
Weston Electrical Instrument Corp. ....	773-776

**Insulation**

Barrett Div., Allied Chemical & Dye Corp. ....	428
Celotex Corp. ....	541
Dant & Russell Sales Co. ....	537-540
Johns-Manville ....	542, 543
Pittsburgh Corning Corp. ....	427
Sprayed Insulation Inc. ....	544

**Insulation, Conduit**

Durant Insulated Pipe Co. ....	581
Ric-wil Co. ....	582

**Insulation, Pipe**

Durant Insulated Pipe Co. ....	581
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**Intercommunication Systems**

Graybar Electric Co., Inc. ....	613
North Electric Mfg. Co. ....	603-606
Radio Corp. of America ....	623-626
Select-O-Phone Div., Kellogg Switchboard & Supply Co. ....	634

**Ironers, Electric, Clothes**

General Electric Co. ....	731-742
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**Ironing Boards**

Mutschler Brothers Co. ....	703-706
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**Irons, Steam**

General Electric Co. ....	731-742
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**Irrigation Systems**

March Automatic Irrigation Co. ....	866
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**Janitors' Supplies**

Clarke Sanding Machine Co. ....	850
Consolidated Laboratories ....	851
Fuller Brush Co. ....	853
Hillyard Sales Companies ....	854, 855
Moulding Floor Mfg. Co. ....	490, 491
Sexauer Mfg. Co., Inc. ....	864
Sexton & Co. ....	694, 695
West Disinfecting Co. ....	860

**Jars & Containers, Stoneware**

Alberene Stone Corp. of Va. ....	745
Knight, Maurice A. ....	755-758
Laboratory Furniture Co., Inc. ....	762, 763
Metalab Equipment Corp. ....	767

**Jellies & Preserves**

Sexton & Co. ....	694, 695
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**Joints, Expansion**

Barrett Div., Allied Chemical & Dye Corp. ....	428
Inland Steel Products Co. ....	424
Jennison-Wright Corporation ....	481-484
Ric-wil Co. ....	582
Safe Tread Co. ....	493-496

**Joists, Steel Bar**

Macomber, Incorporated ....	425
Truscon Steel Company ....	422, 423

**Kettles**

Aluminum Cooking Utensil Co. ....	717
Hotpoint, Inc. ....	699-702
Stahl Co., Harlow C. ....	6908
Straus-Duparquet, Inc. ....	712

**Kilns (see Furnaces, Electric Heat-Treating)****Kitchen Equipment**

Aluminum Cooking Utensil Co. ....	717
Bavinco Mfg. Corp. ....	730
Blickman, Inc. ....	707
Blodgett Co., Inc. ....	708
Boonton Molding Company ....	691
Duke Mfg. Co. ....	710
General Electric Co. ....	731-742
Hercules Food Service Equipment, Inc. ....	698
Hobart Mfg. Co. ....	884
Hotpoint, Inc. ....	699-702
Kewanee Industrial Washer Corp. ....	693
Kewaunee Mfg. Co. ....	728, 729
Keyes Fibre Co. ....	692
Lyon Metal Products, Inc. ....	816, 817
Market Forge Co. ....	711
Stahl Co., Harlow C. ....	6908
Straus-Duparquet, Inc. ....	712
Toledo Scale Co. ....	696

Universal Dishwashing Machinery Co. ....	697
Van Range Co. ....	713
Wood-Metal Industries, Inc. ....	743

**Kitchen Supplies**

Sexton & Co. ....	694, 695
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**Kitchens, Homemaking**

Bavenco Manufacturing Co. ....	730
General Electric Co. ....	731-742
Kewaunee Mfg. Co. ....	728, 729
Lyon Metal Products, Inc. ....	816, 817
Mutschler Brothers Co. ....	703-706
Wood-Metal Industries, Inc. ....	743

**Laboratory Apparatus, Instruments & Equipment**

Bausch & Lomb Optical Co. ....	746, 747
Duriron Co., Inc. ....	749
General Ceramics & Steatite Corp. ....	750
General Electric Co. ....	777-783
General Radio Co. ....	772
Harper Electric Furnace Corp. ....	785
International Business Machines Corp. ....	614, 649
Kewaunee Mfg. Co. ....	728, 729
Klett Mfg. Co. ....	760, 761
Knight, Maurice A. ....	755-758
Leeds & Northrup Co. ....	764, 765
Metalab Equipment Corp. ....	767
Radio Corp. of America ....	623-626
United States Stoneware Co. ....	766
Westinghouse Electric Corp. ....	768-771
Weston Electrical Instrument Corp. ....	773-776

**Laboratory Filter Paper**

Eaton-Dikeman Co. ....	751-754
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**Laboratory Furnaces (see Furnaces, Electric)****Laboratory Furniture**

Kewaunee Mfg. Co. ....	728, 729
Laboratory Furniture Co., Inc. ....	762, 763
Lyon Metal Products, Inc. ....	816, 817
Metalab Equipment Corp. ....	767
Standard Pressed Steel Co. ....	787

**Laboratory Glassware**

Corning Glass Works ....	748
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**Laboratory Panels (see Panels, Control & Laboratory)****Laboratory Pipe, Acid Resisting**

Duriron Co., Inc. ....	749
General Ceramics & Steatite Corp. ....	750
Knight, Maurice A. ....	755-758
United States Stoneware Co. ....	766

**Laboratory Reagents (see Reagents, Chemical)****Laboratory Sinks (see Sinks, Laboratory)****Laboratory Stoneware**

Alberene Stone Corp. of Va. ....	745
General Ceramics & Steatite Corp. ....	750
Kewaunee Mfg. Co. ....	728, 729
Knight, Maurice A. ....	755, 758
Laboratory Furniture Co., Inc. ....	762, 763
Metalab Equipment Corp. ....	767

**Laboratory Switchboards (see Switchboards, Laboratory)****Laminated Beams & Arches**

Roof Structures, Inc. ....	419
Timber Structures, Inc. ....	413-416

**Lampposts, Concrete & Wood**

American Concrete Corporation ....	589
Schwerd Mfg. Co. ....	421

**Lamps**

Graybar Electric Co., Inc. ....	613
Guth Co. ....	595
Kliegl Bros. Universal Electric Stage Lighting Co., Inc. ....	681
Simmons Co. ....	724, 725
Superior Sleeprite Corp. ....	726, 727

**Lamps, Microscope**

Bausch & Lomb Optical Co. ....	746, 747
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**Lanterns**

Schwerd Mfg. Co. ....	421
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**Lath, Metal**

Inland Steel Products Co. ....	424
Truscon Steel Company ....	422, 423

**Lathes, Bench, Metal Working, Precision, Tool Room & Training**

King Machine Tool Div., American Steel Foundries ....	800
LeBlond Machine Tool Co. ....	802
Logan Engineering Co. ....	803
Walker-Turner Div., Kearney & Trecker Corp. ....	804, 805

**Lathes, Woodworking**

Atlas Press Co. ....	784
Walker-Turner Div., Kearney & Trecker Corp. ....	804, 805

**Laundry Bleaching & Sterilizing Solution**

Mathieson Chemical Corp. ....	823
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**Laundry Equipment**

General Electric Co. ....	731-742
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**Lavatories & Fixtures**

Crane Co. ....	587
Sexauer Mfg. Co., Inc. ....	864

**Lawn Mowers & Trimmers, Hand & Machine**

Eclipse Lawn Mower Co. ....	867
Gravely Motor Plow & Cultivator Co. ....	868
Jacobsen Mfg. Co. ....	869
Modern Mfg. Co. ....	870
Moto-Mower Co. ....	865
Worthington Mower Co. ....	872

**Lenses**

Bausch & Lomb Optical Co. ....	746, 747
Capitol Stage Lighting Co. ....	678
Kliegl Bros. Universal Electric Stage Lighting Co., Inc. ....	681
Northwest Studios, Inc. ....	685

**Library Equipment & Supplies**

All-Steel Equipment Inc. ....	672
Art Metal Construction Co. ....	659-666
Berger Mfg. Div., Republic Steel Corp. ....	813
Globe-Wernicke Co. ....	670, 671
Interior Steel Equipment Co. ....	814
Penn Metal Corp. of Penna. ....	820, 821
Remington Rand Inc. ....	653-657
Snead & Co. ....	658
Standard Steel Equipment Co., Inc. ....	815
Universal Equipment Co. ....	723
Universal Steel Equipment Corp. ....	667

**Library Furniture (see Furniture, Office & Library)****Lighting, Fluorescent**

Benjamin Electric Mfg. Co. ....	590, 591
Curtis Lighting, Inc. ....	592, 593

General Electric Co. ....	594; 777-783
Graybar Electric Co., Inc. ....	613
Guth Co. ....	595
Holophane Co., Inc. ....	596, 597
Ruby-Philite Corp. ....	598, 599
Sylvania Electric Products Inc. ....	602
Wakefield Brass Co. ....	600, 601

**Lighting, Stage**

Art Craft Theatre Equipment Co. ....	676
Capitol Stage Lighting Co. ....	678
Clancy, Inc. ....	679
Grosh & Sons Scenic Studios ....	680
Kliegl Bros. Universal Electric Stage Lighting Co., Inc. ....	681
Knoxville Scenic Studios ....	682
Mitchell Industries, Hubert ....	683
Northwest Studios, Inc. ....	685
Novelty Scenic Studios, Inc. ....	686
Pittsburgh Stage & Equipment Studios ..	687

**Lighting, Underwater**

Crouse-Hinds Co. ....	840
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**Lighting Control, Photoelectric**

General Electric Co. ....	777-783
Klett Manufacturing Co. ....	760, 761
Weston Electrical Instrument Co. ....	773-776

**Lighting Equipment and Supplies**

Art Craft Theatre Equipment Co. ....	676
Benjamin Electric Mfg. Co. ....	590, 591
Capitol Stage Lighting Co. ....	678
Clancy, Inc. ....	679
Crouse-Hinds Co. ....	840
Curtis Lighting, Inc. ....	592, 593
General Electric Co. ....	594; 777-783; 841
Graybar Electric Co., Inc. ....	613
Grosh & Sons Scenic Studios ....	680
Guth Co. ....	595
Holophane Co. ....	596, 597
Kliegl Bros. Universal Electric Stage Lighting Co., Inc. ....	681
Knoxville Scenic Studios ....	682
Michaels Art Bronze Co., Inc. ....	467
Mitchell Industries, Hubert ....	683
Northwest Studios, Inc. ....	685
Pittsburgh Stage & Equipment Studios ..	687
Ruby-Philite Corp. ....	598, 599
Snead & Co. ....	658
Sylvania Electric Products ....	602
Wakefield Brass Co. ....	600, 601

**Lighting Fixture Hangers**

Thompson Electric Mfg. Co. ....	611
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**Lighting Fixtures**

American Concrete Corp. ....	589
Benjamin Electric Mfg. Co. ....	590, 591
Capitol Stage Lighting Co. ....	678
Curtis Lighting, Inc. ....	592, 593
General Electric Co. ....	594; 777-783; 841
Graybar Electric Co., Inc. ....	613
Guth Co. ....	595
Holophane Co. ....	596, 597
Kliegl Bros. Universal Electric Stage Lighting Co., Inc. ....	681
Northwest Studios, Inc. ....	685
Pittsburgh Stage & Equipment Studios ..	687
Ruby-Philite Corp. ....	598, 599
Schwerd Mfg. Co. ....	421
Snead & Co. ....	658
Sylvania Electric Products ....	602
Thompson Electric Co. ....	611
Wakefield Brass Co. ....	600, 601

**Lighting Reflectors (see Reflectors, Lighting)**



**Lighting Standards**

American Concrete Corporation ..... 589  
 Schwerd Mfg. Co. .... 421

**Lighting Systems, Emergency**

Electric Storage Battery Co. .... 612

**Light-Proof Shades & Materials**

Columbia Mills, Inc. .... 616  
 Columbus Coated Fabrics Corp. .... 619  
 Draper Shade Co. .... 617  
 Du Pont de Nemours & Co., Inc. ... 904, 905  
 Lindemann Co. .... 618

**Linens**

Straus-Duparquet, Inc. .... 712

**Liquid Soaps & Dispensers (see Soaps & Dispensers)****Lockers, Compartment**

All-Steel Equipment Inc. .... 810, 811  
 Aurora Steel Products Co. .... 812  
 Mutschler Brothers Co. .... 703-706

**Lockers, Steel & Wood**

All-Steel Equipment Inc. .... 810, 811  
 Aurora Steel Products Co. .... 812  
 Berger Mfg. Div., Republic Steel Corp. .. 813  
 Interior Steel Equipment Co. .... 814  
 Lyon Metal Products, Inc. .... 816, 817  
 Medart Products, Inc. .... 818, 819  
 Mutschler Brothers Co. .... 703-706  
 Nelson Company, Inc., A. R. .... 524  
 Penn Metal Corporation of Penna. ... 820, 821  
 Standard Steel Equipment Co., Inc. .... 815

**Locks, Combination & Key**

Dudley Lock Corp. .... 806  
 Master Lock Co. .... 807  
 National Lock Co. .... 808  
 Yale & Towne Mfg. Co. .... 809

**Longspans (see Roof Arches & Construction)****Loose Leaf Books & Systems (see Filing Systems)****Loud Speakers (see Speakers, Loud)****Magnifiers**

Bausch & Lomb Optical Co. .... 746, 747

**Masonry Restoration**

Empire Varnish Co. .... 852  
 Structural Waterproofing Corp. .... 503  
 Western Waterproofing Companies ... 509-512  
 Western Waterproofing Co. .... 504

**Mats, Floor**

American Floor Products Co. .... 502

**Mats, Gymnasium**

American Playground Device Co. ... 842, 843  
 Recreation Equipment Co. .... 846

**Mattresses**

Simmons Co. .... 724, 725  
 Straus-Duparquet, Inc. .... 712  
 Superior Sleeprite Corp. .... 726, 727

**Measuring Tapes**

Lufkin Rule Co. .... 792  
 Starrett Co. .... 795

**Meat Tenderizers**

Hobart Manufacturing Co. .... 884  
 Toledo Scale Co. .... 696

**Melting Pots, Electric**

Pereny Equipment Co. .... 786

**Memorial Plaques**

International Bronze Tablet Co., Inc. ... 464  
 Matthews & Co., Jas. H. .... 465  
 Michaels Art Bronze Co., Inc. .... 467  
 McGann & Sons Co. .... 466  
 Stewart Iron Works Co. .... 879

**Merry-Go-Rounds**

American Playground Device Co. ... 842, 843  
 Burke Co. .... 844  
 General Playground Equipment Inc. .... 845  
 Recreation Equipment Co. .... 846

**Metal Weather Strips**

Accurate Metal Weather Strip Co., Inc. . 468

**Metal Working Machinery**

Atlas Press Co. .... 784  
 Brown & Sharpe Mfg. Co. .... 790; 801  
 Cincinnati Milling Machine Co., Cincinnati Grinders, Inc. .... 903  
 Kearney & Trecker Corp. .... 899-902  
 King Machine Tool Div., American Steel Foundries ..... 800  
 LeBlond Machine Tool Co. .... 802  
 Logan Engineering Co. .... 803  
 SkilSaw, Inc. .... 798  
 Starrett Co. .... 795  
 Walker-Turner Div., Kearney & Trecker Corp. .... 804, 805

**Meters, Electric**

General Electric Co. .... 777-783  
 General Radio Co. .... 772  
 Graybar Electric Co., Inc. .... 613  
 Klett Manufacturing Co. .... 760, 761  
 Leeds & Northrup Co. .... 764, 765  
 Westinghouse Electric Corp. .... 768-771  
 Weston Electrical Instrument Corp. ... 773-776

**Micrometers**

Brown & Sharpe Mfg. Co. .... 790; 801  
 Lufkin Rule Co. .... 792  
 Millers Falls Co. .... 793  
 Westinghouse Electric Corp. .... 768-771  
 Weston Electrical Instrument Corp. ... 773-776

**Microphones**

Clancy, Inc. .... 679  
 Radio Corp. of America .... 623-626

**Micro-Projectors**

Bausch & Lomb Optical Co. .... 746, 747

**Microscope Lamps**

Bausch & Lomb Optical Co. .... 746, 747

**Microscopes & Accessories**

Bausch & Lomb Optical Co. .... 746, 747

**Microtomes**

Bausch & Lomb Optical Co. .... 746, 747

**Milling Machines**

Atlas Press Co. .... 784  
 Brown & Sharpe Mfg. Co. .... 790; 801  
 Cincinnati Milling Machine Co., Cincinnati Grinders, Inc. .... 903  
 Kearney & Trecker Corp. .... 899-902

**Mirrors, Dormitory**

Carron Industries, Inc. .... 718  
 Simmons Company .... 724, 725  
 Superior Sleeprite Corp. .... 726, 727

**Mixers, Food**

General Electric Co. .... 731-742  
 Hobart Mfg. Co. .... 884

**Mops & Moppers**

Clarke Sanding Machine Co. .... 850  
 Fuller Brush Co. .... 853  
 Kent Co., Inc. .... 857

**Motion Picture Equipment (see Projection Accessories & Equipment)****Motion Picture Screens**

Clancy, Inc. .... 679  
 Grash & Sons Scenic Studios ..... 680  
 Mork-Green Studios, Inc. .... 684  
 Northwest Studios, Inc. .... 685

**Motor Generator Sets & Motors**

Automatic Devices Co. .... 677  
 General Electric Co. .... 777-783  
 Walker-Turner Div., Kearney & Trecker Corp. .... 804, 805

**Moulding**

Inland Steel Products Co. .... 424

**Mowers, Gang Units**

Gravely Motor Plow & Cultivator Co. ... 868

**Mowers, Lawn (see Lawn Mowers & Trimmers, Hand & Machine)****Museum Cases (see Cases, Museum & Display)****Musical Instruments**

Baldwin Piano Co. .... 635  
 Estey Organ Corp. .... 636  
 Everett Piano Co. .... 637  
 Steinway & Sons ..... 638

**Name Plates, Bronze**

International Bronze Tablet Co., Inc. ... 464  
 Matthews & Co., Jas. H. .... 465  
 Michaels Art Bronze Co., Inc. .... 467  
 McGann & Sons Co. .... 466

**Nets, Tennis**

American Playground Device Co. ... 842, 843

**Nosings, Safety (see Safety Floor & Stair Treads)****Nurseries & Greenhouses**

Lord and Burnham ..... 883

**Office Furniture & Equipment**

All-Steel Equipment Inc. .... 672; 810, 811  
 American Seating Co. .... 639-642  
 Art Metal Construction Co. .... 659-666  
 Aurora Steel Products Company ..... 812  
 Berger Mfg. Div., Republic Steel Corp. .. 813  
 Diebold, Inc. .... 668, 669  
 Ediphone, Thomas A. Edison, Inc. .... 648  
 Globe-Wernicke Co. .... 670, 671  
 Irwin Seating Co. .... 622  
 Lyon Metal Products, Inc. .... 816, 817  
 Metal Office Furniture Co. .... 673  
 Michaels Art Bronze Co., Inc. .... 467  
 Mosler Safe Co. .... 674  
 National Cash Register Co. .... 652  
 Penn Metal Corp. of Penna. .... 820, 821  
 Remington Rand Inc. .... 653-657  
 Standard Steel Equipment Co., Inc. .... 815

**Office Machines**

Ediphone-Thomas A. Edison, Inc. .... 648  
 International Business Machines Corp. 614; 649  
 National Cash Register Co. .... 652  
 Underwood Corp. .... 650, 651

**Office Supplies**

Globe-Wernicke Co. ....	670, 671
Remington Rand Inc. ....	653-657
Underwood Corp. ....	650, 651

**Offset Printing Equipment (see Printing Presses, Equipment & Supplies)****Oil Burners**

Petroleum Heat & Power Co. ....	546, 547
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**Oil Preheating System**

Fluid Systems, Inc. ....	521
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**Organs, Folding, Reed, Symphonic**

Estey Organ Corp. ....	636
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**Oscillators**

General Radio Co. ....	772
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**Oscillometers (see Meters)****Ottomans (see Dormitory Furniture)****Outdoor Lighting Standards (see Lighting Standards)****Outlet Plates**

General Electric Co. ....	777-783
Graybar Electric Co., Inc. ....	613
Kliegl Bros. Universal Electric Stage Lighting Co., Inc. ....	681
Northwest Studios, Inc. ....	685

**Ovens, Electric**

General Electric Co. ....	731-742
Graybar Electric Co., Inc. ....	613
Harper Electric Furnace Corp. ....	785
Hotpoint, Inc. ....	699-702
Pereny Equipment Co. ....	786

**Ovens, Gas**

Blodgett Co., Inc. ....	708
Straus-Duparquet, Inc. ....	712
Van Range Co. ....	713

**Padlocks**

Dudley Lock Corp. ....	806
Master Lock Co. ....	807
National Lock Co. ....	808
Yale & Towne Mfg. Co. ....	809

**Paint, Cement, Protective, Rustproof and Wall**

Barrett Div., Allied Chemical & Dye Corp. ....	428
Empire Varnish Co. ....	852
Endur Paint Company, ....	529-536
Standard Dry Wall Products ....	505-508

**Paint, Chalkboard**

Endur Paint Company ....	529-536
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**Paint, Interior, Exterior**

Endur Paint Company ....	529-536
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**Paint Products**

Empire Varnish Co. ....	852
Endur Paint Company ....	529-536
Standard Dry Wall Products ....	505-508

**Paneling**

Celotex Corp. ....	541
Formica Co. ....	715, 716
Hauserman Co., E. F. ....	513-516
Martin-Parry Corp. ....	517-520
Mosaic Tile Company ....	469-472
National Fireproofing Corp. ....	473
United States Plywood Corp. ....	463

**Panels, Control & Laboratory**

General Electric Co. ....	777-783
Graybar Electric Co., Inc. ....	613
International Business Machines Corp. ....	614, 649
Radio Corp. of America ....	623-626

Standard Electric Time Co. ....	607-610
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Westinghouse Electric Corp. ....	768-771
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Weston Electrical Instrument Corp. ....	773-776
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**Paper Cutters**

American Type Founders Sales Corp. ....	788, 789
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**Paper Dishes**

Keyes Fibre Co. ....	692
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**Paper Napkins, Doilies & Tray Covers**

Sexton & Co. ....	694, 695
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**Paper Towels**

West Disinfecting Co. ....	860
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**Papers, Filter**

Eaton-Dikeman Co. ....	751-754
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**Parking Meters**

Michaels Art Bronze Co., Inc. ....	467
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**Partition Panels, Load Bearing**

National Fireproofing Corp. ....	473
Macomber, Incorporated ....	425

**Partitions, Folding, Movable**

Cornell Iron Works, Inc. ....	461
Hauserman Co., E. F. ....	513-516
Horn Brothers Co. ....	826, 827
Johns Manville ....	542, 543
Kinnear Mfg. Co. ....	462
Martin-Parry Corp. ....	517-520
Richards-Wilcox Mfg. Co. ....	525
Snead & Co. ....	658
Steel Partitions, Inc. ....	621
United States Plywood Corp. ....	463

**Partitions, Glass Block**

American Structural Products Co. ....	445
American 3 Way-Luxfer Prism Co. ....	571-578
Pittsburgh Corning Corp. ....	446, 447

**Partitions, Office & Classroom**

Hauserman Co., E. F. ....	513-516
Johns Manville ....	542, 543
Martin-Parry Corp. ....	517-520
Snead & Co. ....	658
Steel Partitions, Inc. ....	621

**Partitions, Toilet & Shower**

Alberene Stone Corp. of Virginia ....	420
Martin-Parry Corp. ....	517-520
Mosaic Tile Co. ....	469-472
National Fireproofing Corp. ....	473
United States Plywood Corp. ....	463
United States Quarry Tile Co. ....	474

**Pavements, Walks, Treading, etc.**

Barrett Div., Allied Chemical & Dye Corp. ....	428
Stancal Asphalt & Bitumuls Co. & American Bitumuls Co. ....	873

**Peelers, Vegetable**

Hobart Mfg. Co. ....	884
Toledo Scale Co. ....	696

**pH Instruments and Electrodes**

Leeds & Northrup Co. ....	764, 765
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**Pharmaceutical Laboratory Equipment**

Klett Manufacturing Co. ....	760, 761
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**Pharmaceutical Supplies**

Corning Glass Works ....	748
Eaton-Dikeman Co. ....	751-754
General Chemical Div., Allied Chemical & Dye Corp. ....	759

**Photo-Copy Equipment**

General Photo Products Co. ....	634B
Remington Rand Inc. ....	653-657

**Photoelectric Units**

General Electric Co. ....	777-783
Klett Manufacturing Co. ....	760, 761
Weston Electrical Instrument Corp. ....	773-776

**Photoreproduction Equipment**

General Photo Products Co. ....	634B
Remington Rand Inc. ....	653-657

**Physics, Apparatus for**

General Electric Co. ....	777-783
General Radio Co. ....	772
Klett Manufacturing Co. ....	760, 761
Leeds & Northrup Co. ....	764, 765
Westinghouse Electric Corp. ....	768-771
Weston Electrical Instrument Corp. ....	773-776

**Piano Casters (see Casters)****Pianos**

Baldwin Piano Co. ....	635
Everett Piano Co. ....	637
Steinway & Sons ....	638

**Pilasters**

Schwerd Mfg. Co. ....	421
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**Piling**

Jennison-Wright Corporation ....	481-484
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**Pipe & Fittings**

Crane Co. ....	587
Duriron Co., Inc. ....	749
General Ceramics & Steatite Corp. ....	750
Knight, Maurice A. ....	755-758
Sexauer Mfg. Co., Inc. ....	864
Symmons Engineering Co. ....	588

**Pipe & Fittings, Acid Resistant**

Alberene Stone Corp. of Va. ....	745
Duriron Co., Inc. ....	749
General Ceramics & Steatite Corp. ....	750
Knight, Maurice A. ....	755-758
Sexauer Mfg. Co., Inc. ....	864
United States Stoneware Co. ....	766

**Pipe Covering**

Durant Insulated Pipe Co. ....	581
Ric-wil Co. ....	582
Sexauer Mfg. Co., Inc. ....	864

**Pipe Insulation**

Durant Insulated Pipe Co. ....	581
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**Pipe Organs**

Estey Organ Corp. ....	636
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**Planes**

Miller Falls Co. ....	793
Porter-Cable Machine Co. ....	797, 859
Stanley Tools ....	794

**Planfiles**

Art Metal Construction Co. ....	659-666
Diebold, Inc. ....	668, 669
Globe-Wernicke Co. ....	670, 671
Remington Rand Inc. ....	653-657

**Plaques, Wall**

International Bronze Tablet Co., Inc. ....	464
Matthews & Co., Jas. H. ....	465
Michaels Art Bronze Co., Inc. ....	467
McGann & Sons Co. ....	466
Stewart Iron Works Co. ....	879

**Plaster Sheeting**

United States Plywood Corp. ....	463
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**Plastic Tile (see Tile)**

- Plastic Ware, Lighting**  
Wakefield Brass Co. ....600, 601
- Plate Glass**  
Libbey-Owens-Ford Glass Co. .... 448
- Platforms & Stands, Folding (see Stands & Platforms, Folding)**
- Playground Equipment**  
American Playground Device Co. ...842, 843  
Burke Co. .... 844  
Colorado Fuel & Iron Corp., Wickwire Spencer Steel Div. .... 875  
Cyclone Fence Div., American Steel & Wire Co. .... 877  
General Playground Equipment Inc. .... 845  
Medart Products, Inc. ....834, 835  
Recreation Equipment Co. .... 846  
Stewart Iron Works Co. .... 879
- Plinths**  
Schwerd Mfg. Co. .... 421
- Plumbing Supplies**  
Crane Co. .... 587  
Sexauer Mfg. Co., Inc. .... 864  
Symmons Engineering Co. .... 588  
Warren Wester & Co. ....566, 567
- Poles, Flag, Sign, Lighting, etc.**  
Stewart Iron Works Co. .... 879
- Polish, Furniture & Metal**  
Consolidated Laboratories .... 851  
Fuller Brush Co. .... 853  
Hillyard Sales Companies ....854, 855
- Polish, Porcelain (see Porcelain Polish)**
- Polishers, Floor (see Floor Machines)**
- Pool Cleaning Equipment (see Cleaners, Swimming Pool)**
- Popcorn Vending Machines**  
Manley, Inc. ....887-890
- Porcelain Polish**  
Consolidated Laboratories .... 851  
Hillyard Sales Companies ....854, 855  
Sexauer Mfg. Co., Inc. .... 864  
West Disinfecting Co. .... 860
- Portable Bleachers (see Bleachers)**
- Portable Chairs (see Chairs, Folding & Portable)**
- Portable Motion Picture Screens (see Screens, Motion Picture)**
- Portable Typewriters (see Typewriters)**
- Posts, Terminal**  
Anchor Post Products, Inc. .... 874  
Colorado Fuel & Iron Corp., Wickwire Spencer Steel Div. .... 875  
Continental Steel Corp. .... 876  
Cyclone Fence Div., American Steel & Wire Co. .... 877  
Pittsburgh Steel Co. .... 878  
Stewart Iron Works Co. .... 879
- Potentiometers**  
General Electric Co. ....777-783  
Leeds & Northrup Co. ....764, 765
- Westinghouse Electric Corp. ....768-771  
Weston Electrical Instrument Corp. ....773-776
- Pots and Pans**  
Aluminum Cooking Utensil Co. .... 717  
Hercules Food Service Equipment, Inc. ... 698  
Stahl Co., Harlow C. .... 6908  
Straus-Duparquet, Inc. .... 712
- Potter Wheels**  
Pereny Equipment Co. .... 786
- Power Lawn Mowers**  
Eclipse Lawn Mower Co. .... 867  
Gravely Motor Plow & Cultivator Co. ... 868  
Jacobson Mfg. Co. .... 869  
Moto-Mower Co. .... 865  
Worthington Mower Co. .... 872
- Power Sweepers**  
Modern Manufacturing Co. .... 870  
Wilshire Power Sweeper Co. .... 871
- Power Ventilators**  
Hirschman-Pohle Co., Inc. .... 579  
Swartwout Company .... 580
- Precision Tools, Hand (see Tools, Precision Hand)**
- Printing Presses, Equipment & Supplies**  
American Type Founders Sales Corp. 788, 789
- Program Clocks (see Clocks, Electric Program, Tower & Outside)**
- Projection Accessories, Equipment & Films**  
Ampro Corp. .... 627  
Bausch & Lomb Optical Co. ....628, 629  
Bell & Howell Co. .... 630  
Beseler Company, Charles .... 631  
Clancy, Inc. .... 679  
General Electric Co. ....777-783  
Radio Corp. of America ....623-626  
Squibb-Taylor, Inc. ....634A
- Projection Instruments, Laboratory**  
Bausch & Lomb Optical Co. ....628, 629  
Weston Electrical Instrument Corp. ....773-776
- Projectors, 16mm.**  
Ampro Corp. .... 627  
Radio Corp. of America ....623-626
- Projectors, Opaque**  
Bausch & Lomb Optical Co. ....628, 629  
Beseler Co., Charles .... 631  
Squibb-Taylor, Inc. ....634A
- Projectors, Slide**  
Ampro Corp. .... 627  
Bausch & Lomb Optical Co. ....628, 629  
Bell & Howell Co. .... 630  
Beseler Co., Charles .... 631
- Public Address Systems**  
Graybar Electric Co., Inc. .... 613  
Radio Corp. of America ....623-626
- Pulleys**  
Thompson Electric Co. .... 611
- Pumps, Centrifugal**  
Nash Engineering Co. .... 561
- Pumps, Hand & Electric**  
Brown & Sharpe Mfg. Co. ....790; 801
- Pumps, Vacuum & Pressure**  
Nash Engineering Co. .... 561
- Racks, Basket, Gym, etc.**  
All-Steel Equipment, Inc. ....810, 811  
American Playground Device Co. ...842, 843  
Aurora Steel Products Co. .... 812  
Interior Steel Equipment Co. .... 814  
Medart Products, Inc. ....818, 819
- Racks, Bicycle (see Bicycle Racks)**
- Racks, Tool**  
Berger Mfg. Div., Republic Steel Corp. ... 813  
Lyon Metal Products, Inc. ....816, 817  
Penn Metal Corp. of Penna. ....820, 821  
Standard Pressed Steel Co. .... 787  
Standard Steel Equipment Co., Inc. .... 815  
Universal Steel Equipment Corp. .... 667
- Radial Drills and Saws**  
Millers Falls Co. .... 793  
SkilSaw, Inc. .... 798  
Walker-Turner Div., Kearney & Trecker Corp. ....804, 805
- Radiator Valves (see Valves, Radiator)**
- Radiators**  
Crane Co. .... 587  
Shaw-Perkins Mfg. Co. ....569, 570  
Warren Webster & Co. ....566, 567
- Radiators, Panel**  
Shaw-Perkins Mfg. Co. ....569, 570
- Radio Laboratory and FM Broadcasting Equipment**  
General Radio Co. .... 772  
Radio Corp. of America ....623-626
- Radios and Radio Parts**  
Radio Corp. of America ....623-626
- Ranges, Electric**  
General Electric Co. ....731-742  
Graybar Electric Co., Inc. .... 613  
Hotpoint, Inc. ....699-702
- Ranges, Gas**  
Blodgett Co., Inc. .... 708  
Straus-Duparquet, Inc. .... 712  
Van Range Co. .... 713
- Reagents, Chemical**  
General Chemical Div., Allied Chemical & Dye Corp. .... 739
- Receptacles, Waste**  
National Vulcanized Fibre Co. .... 863  
West Disinfecting Co. .... 860
- Record Players**  
Radio Corp. of America ....623-626
- Record Reproducing Equipment (see Photoreproduction Equipment)**
- Record Systems**  
Art Metal Construction Co. ....659-666  
Diebold, Inc. ....668, 669  
Globe-Wernicke Co. ....670, 671  
International Business Machines Corp. 614; 649  
Remington Rand Inc. ....653-657
- Recorders, Tape, Wire, Disc**  
Ampro Corp. .... 627  
Presto Recording Corp. .... 633  
Radio Corp. of America ....623-626



**Recorders & Controllers, Temperature, CO<sub>2</sub>, etc.**

Klett Manufacturing Co. ....	760, 761
Leeds & Northrup Co. ....	764, 765
Westinghouse Electric Corp. ....	768-771

**Recording Equipment, Voice**

Brush Development Co. ....	632
Ediphone-Thomas A. Edison, Inc. ....	648
Presto Recording Corp. ....	633
Radio Corp. of America. ....	623-626

**Rectifiers & Rectifier Panels**

General Electric Co. ....	777-783
Graybar Electric Co., Inc. ....	613

**Reed Organs**

Estey Organ Corp. ....	636
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**Reflectors, Lighting**

American Structural Products Co. ....	445
American 3 Way-Luxfer Prism Co. ....	571-578
Benjamin Electric Mfg. Co. ....	590, 591
Capitol Stage Lighting Co. ....	678
Crouse-Hinds Co. ....	840
Curtis Lighting, Inc. ....	592, 593
General Electric Co. ....	841
Graybar Electric Co., Inc. ....	613
Guth Co. ....	595
Holophane Co., Inc. ....	596, 597
Kliegl Bros., Universal Electric Stage Light- ing Co., Inc. ....	681
Snead & Co. ....	658
Sylvania Electric Products ....	602
Wakefield Brass Co. ....	600, 601

**Refrigerators**

General Electric Co. ....	731-742
Straus-Duparquet, Inc. ....	712

**Relays**

General Electric Co. ....	777-783
Weston Electrical Instrument Corp. ....	773-776

**Remover, Varnish & Wax**

Hillyard Sales Companies ....	854, 855
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**Resistors**

Leeds & Northrup Co. ....	764, 765
Westinghouse Electric Corp. ....	768-771

**Rollers, Grass**

Jacobsen Mfg. Co. ....	869
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**Roof Arches & Construction**

Arch Roof Construction Co., Inc. ....	417
Concrete Plank Company ....	426
Macomber, Incorporated ....	425
Roof Structures, Inc. ....	419
Timber Structures, Inc. ....	413-416
Truscon Steel Company ....	422, 423

**Roof Coatings**

Barrett Div., Allied Chemical & Dye Corp. ....	428
Texas Co. ....	429

**Roof Trusses, Steel (see Roof Arches & Construction)****Roof Ventilators (see Ventilators, Power & Roof)****Roofing**

Barrett Div., Allied Chemical & Dye Corp. ....	428
Concrete Plank Company ....	426
Johns-Manville ....	542, 543
National Fireproofing Corp. ....	473
Pittsburgh Corning Corp. ....	427

Stancal Asphalt & Bitumuls Co. & Ameri- can Bitumuls Co. ....	873
Texas Co. ....	429
Truscon Steel Company ....	422, 423

**Router-Shaper, Portable**

Millers Falls Co. ....	793
Porter-Cable Machine Co. ....	797; 859
Stanley Electric Tools ....	799

**Rug Shampooing Machines**

Breuer Electric Mfg. Co. ....	849
Consolidated Laboratories ....	851
General Electric Co. ....	861
General Floorcraft, Inc. ....	856
Hillyard Sales Companies ....	854, 855
Kent Co., Inc. ....	857
Lincoln-Schlueter Floor-Machinery Co., Inc. ....	858

**Rules**

Brown & Sharpe Co. ....	790; 801
Lufkin Rule Co. ....	792
Millers Falls Co. ....	793
Stanley Tools ....	794
Starrett Co. ....	795

**Runners, Rubber, Floor**

American Floor Products Co. ....	502
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**Rustproof Paint (see Paints, Cement, Rustproof & Wall)****Safes**

Art Metal Construction Co. ....	659-666
Diebold, Inc. ....	668, 669
Mosler Safe Co. ....	674
Remington Rand Inc. ....	653-657

**Safety Floor & Stair Treads**

Alberene Stone Corp. of Va. ....	420
American Abrasive Metals Co. ....	479
American Floor Products Co. ....	502
Moulding Floor Mfg. Co. ....	490, 491
Safe Tread Co. ....	493-496
Servicised Products Corp. ....	497
Stancal Asphalt & Bitumuls Co. & Ameri- can Bitumuls Co. ....	873
Wooster Products, Inc. ....	500, 501

**Sanders**

American Floor Surfacing Machine Co. ....	848
Black & Decker Mfg. Co. ....	796
Clarke Sanding Machine Co. ....	850
Millers Falls Co. ....	793
SkilSaw, Inc. ....	798
Stanley Electric Tools ....	799

**Sanders, Floor**

American Floor Surfacing Machine Co. ....	848
Clarke Sanding Machine Co. ....	850
General Floorcraft, Inc. ....	856
Lincoln-Schlueter Floor-Machinery Co. ....	858
Porter-Cable Machine Co. ....	797; 859
SkilSaw, Inc. ....	798

**Sash, Window**

Adams & Westlake Co. ....	433-436
Austral Sales Corp. ....	401-412
Bayley Co., William ....	442, 443
Gate City Sash & Door Co. ....	431
Storms & Co., Albert ....	441
Truscon Steel Company ....	422, 423
Universal Window Co. ....	444

**Sawing Equipment, Concrete, Asphalt**

Cutcrete Corporation ....	620
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**Saws, Band, Circular, Scroll, etc.**

Atlas Press Co. ....	784
Black & Decker Mfg. Co. ....	796
Porter-Cable Machine Co. ....	797; 859
SkilSaw, Inc. ....	798
Starrett Co. ....	795
Walker-Turner Div., Kearney & Trecker Corp. ....	804, 805

**Saws, Hack**

Millers Falls Co. ....	793
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**Scaffolds**

Safway Steel Products, Inc. ....	836
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**Scales**

Hobart Manufacturing Co. ....	884
Toledo Scale Co. ....	696

**Scenery, Stage**

Art Craft Theatre Equipment Co. ....	676
Grosh & Sons Scenic Studios ....	680
Knoxville Scenic Studios ....	682
Mitchell Industries, Hubert ....	683
Mork-Green Studios, Inc. ....	684
Northwest Studios, Inc. ....	685
Novelty Scenic Studios, Inc. ....	686
Pittsburgh Stage & Equipment Studios ....	687
Twin City Scenic Company ....	688
Volland Studios ....	689

**School Buses**

Ford Motor Company ....	880
Oneida Products Corp. ....	882
Superior Coach Corp. ....	881

**School Records & Forms (see Filing Systems & Supplies)****Scoreboards**

International Business Machines Corp. ....	614; 649
Medart Products, Inc. ....	834, 835

**Screens, Motion Picture**

Clancy, Inc. ....	679
Grosh & Sons Scenic Studios ....	680
Mork-Green Studios, Inc. ....	684
Northwest Studios Inc. ....	685

**Screwdrivers**

Black & Decker Mfg. Co. ....	796
Greenlee Tool Co. ....	791
Millers Falls Co. ....	793
Stanley Tools ....	794

**Screw Machines**

Brown & Sharpe Mfg. Co. ....	790; 801
Logan Engineering Co. ....	803

**Scrubbing-Polishing Machines, Electric**

Advance Floor Machine Co. ....	847
American Floor Surfacing Machine Co. ....	848
Breuer Electric Mfg. Co. ....	849
Clarke Sanding Machine Co. ....	850
Consolidated Laboratories ....	851
General Floorcraft, Inc. ....	856
Hillyard Sales Companies, ....	854, 855
Kent Co., Inc. ....	857
Lincoln-Schlueter Floor-Machinery Co., Inc. ....	858

**Scythe, Power**

Jacobsen Mfg. Co. ....	869
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**Seals, Floor**

Consolidated Laboratories ....	851
Empire Varnish Co. ....	852
Hillyard Sales Companies ....	854, 855

Storm Flooring Co. ....498, 499  
West Disinfecting Co. .... 860

### Seating, Auditorium, Classroom, etc. (see Chairs)

### Seating, Grandstand & Bleacher

Horn Brothers Co. ....826, 827  
Hussey Mfg. Co., Inc. .... 830  
Leavitt Corp. ....828, 829  
Long Island Bleacher Co., Inc. .... 825  
Medart Products, Inc. ....834, 835  
National Store Fixture Co. ....719-722  
Pittsburgh-Des Moines Steel Co. .... 831  
Queensboro Steel Corp. .... 832  
Republic Structural Iron Works .... 833  
Safway Steel Products, Inc. .... 836  
Timber Structures, Inc. ....413-416  
Universal Bleacher Co. .... 837  
Wayne Iron Works ....838, 839

### Sectional Filing Equipment

Art Metal Construction Co. ....659-666  
Diebold, Inc. ....668, 669  
Globe-Wernicke Co. ....670, 671  
Metal Office Furniture Co. .... 673  
Remington Rand Inc. ....653-657  
Snead & Co. .... 658

### See-Saws

American Playground Device Co. ....842, 843  
Burke Co. .... 844  
General Playground Equipment Inc. .... 845  
Recreation Equipment Co. .... 846

### Settees

American Playground Device Co. ....842, 843  
Stewart Iron Works Co. .... 879

### Sewage Ejectors

Nash Engineering Co. .... 561

### Sewing Machines

Singer Sewing Machine Co. .... 744

### Sewing Room Equipment

Bavinco Mfg. Corp. .... 730  
Mutschler Brothers Co. ....703-706  
Singer Sewing Machine Co. .... 744  
Wood-Metal Industries, Inc. .... 743

### Shade Fixtures

Draper Shade Co. .... 617

### Shades, Window

Columbia Mills, Inc. .... 616  
Columbus Coated Fabrics Corp. .... 619  
Draper Shade Co. .... 617  
Du Pont de Nemours & Co., Inc. ....904, 905  
Lindemann Co. .... 618

### Shapers

Atlas Press Co. .... 784  
Logan Engineering Co. .... 803  
Porter-Cable Machine Co. ....797; 859  
Walker-Turner Div., Kearney & Trecker Corp. ....804, 805

### Sharpeners, Lawn Mower

Modern Manufacturing Co. .... 870

### Shears, Portable Electric

Black & Decker Mfg. Co. .... 796  
Porter-Cable Machine Co. ....797; 859  
SkilSaw, Inc. .... 798  
Stanley Electric Tools .... 799

### Shelving, Steel

All-Steel Equipment Inc. ....810, 811  
Art Metal Construction Co. ....659-666  
Aurora Steel Products Company .... 812  
Berger Mfg. Div., Republic Steel Corp. .. 813  
Globe-Wernicke Co. ....670, 671  
Interior Steel Equipment Co. .... 814  
Lyon Metal Products, Inc. ....816, 817  
Medart Products, Inc. ....818, 819  
Nelson Company, Inc., A. R. .... 524  
Penn Metal Corporation of Penna. ....820, 821  
Remington Rand Inc. ....653-657  
Snead & Co. .... 658  
Standard Steel Equipment Co., Inc. .... 815  
Universal Steel Equipment Corp. .... 667

### Shelving, Stoneware

Alberene Stone Corp. of Va. .... 745  
Knight, Maurice A. ....755-758  
Laboratory Furniture Co., Inc. ....762, 763  
Metalab Equipment Corp. .... 767  
United States Stoneware Co. .... 766

### Shields, Light (see Lighting Fixtures)

### Shingles, Asbestos, Asphalt, etc.

Barrett Div., Allied Chemical & Dye Corp. 428  
Johns-Manville ....542, 543  
Texas Co. .... 429

### Shop Equipment

American Type Founders Sales Corp. 788, 789  
Atlas Press Co. .... 784  
Aurora Steel Products Company .... 812  
Berger Mfg. Div., Republic Steel Co. .... 813  
Black & Decker Mfg. Co. .... 796  
Brown & Sharpe Mfg. Co. ....790; 801  
Cincinnati Milling Machine Co., Cincinnati Grinders, Inc. .... 903  
General Electric Co. ....777-783  
Greenlee Tool Co. .... 791  
Kearney & Trecker Corp. ....899-902  
King Machine Tool Div., American Steel Foundries .... 800  
LeBlond Machine Tool Co. .... 802  
Logan Engineering Co. .... 803  
Lufkin Rule Co. .... 792  
Lyon Metal Products, Inc. ....816, 817  
Millers Falls Co. .... 793  
Penn Metal Corporation of Penna. ....820, 821  
Porter-Cable Machine Co. ....797; 859  
SkilSaw, Inc. .... 798  
Stanley Electric Tools .... 799  
Stanley Tools .... 794  
Standard Pressed Steel Co. .... 787  
Standard Steel Equipment Co., Inc. .... 815  
Starrett Co. .... 795  
Universal Steel Equipment Corp. .... 667  
Walker-Turner Div., Kearney & Trecker Corp. ....804, 805

### Shower Compartments, Stone

Alberene Stone Corp. of Va. .... 420

### Shower Fixtures

Crane Co. .... 587  
Symmons Engineering Co. .... 588

### Shutters, Fire

Cornell Iron Works, Inc. .... 461  
Kinnear Mfg. Co. .... 462

### Sickle Mowers (see Lawn Mowers)

### Signal Systems

Graybar Electric Co., Inc. .... 613  
International Business Machines Corp. 614; 649

Montgomery Mfg. Co. .... 615  
Select-O-Phone Div., Kellogg Switchboard & Supply Co. .... 634  
Standard Electric Time Co. ....607-610

### Signs & Tablets, Bronze (see Bronze Tablets & Signs)

### Sills (Door & Window)

Alberene Stone Corp. of Va. .... 420  
American Abrasive Metals Co. .... 479  
American Mason Safety Tread Co. .... 480  
Matthews & Co., Jas. H. .... 465  
Michaels Art Bronze Co., Inc. .... 467  
Safe Tread Co. ....493-496  
Wooster Products, Inc. ....500, 501

### Silverware

International Silverware Co. .... 690  
Straus-Duparquet, Inc. .... 712

### Sinks, Kitchen

Bavinco Mfg. Corp. .... 730  
Blickman, Inc. .... 707  
General Electric Co. ....731-742  
Hercules Food Service Equipment, Inc. .. 698  
Kewaunee Mfg. Co. ....728, 729  
Lyon Metal Products, Inc. ....816, 817  
Straus-Duparquet, Inc. .... 712  
Van Range Co. .... 713  
Wood-Metal Industries, Inc. .... 743

### Sinks, Laboratory

Alberene Stone Corp. of Va. .... 745  
Duriron Co., Inc. .... 749  
General Ceramics & Steatite Corp. .... 750  
Kewaunee Mfg. Co. ....728, 729  
Knight, Maurice A. ....755-758  
Laboratory Furniture Co., Inc. ....762, 763  
Metalab Equipment Corp. .... 767  
United States Stoneware Co. .... 766

### Sinks, Wash

Crane Co. .... 587

### Skylights

American 3 Way-Luxfer Prism Co. ....571-578

### Slicing Machines

Hobart Mfg. Co. .... 884  
Toledo Scale Co. .... 696

### Slide Films (see Films, Film Slides & Film Strips)

### Slide Projectors

Ampro Corp. .... 627  
Bausch & Lomb Optical Co. ....628, 629  
Bell & Howell Co. .... 630  
Beseler Company, Charles .... 631

### Slides, Playground

American Playground Device Co. ....842, 843  
Burke Co. .... 844  
General Playground Equipment Inc. .... 845  
Recreation Equipment Co. .... 846

### Smoke Screens

Steel Partitions, Inc. .... 621

### Snow Plows

Gravely Motor Plow & Cultivator Co. ... 868

### Soaps, Floor

Consolidated Laboratories .... 851  
Hillyard Sales Companies ....854, 855  
Moulding Floor Mfg. Co. ....490, 491  
West Disinfecting Co. .... 860



**Soaps & Dispensers**

Consolidated Laboratories	851
Hillyard Sales Companies	854, 855
Sexton & Co.	694, 695
West Disinfecting Co.	860

**Soapstone**

Alberene Stone Corp. of Va.	420
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**Sound Deadening Materials**

Celotex Corp.	541
Dant & Russell Sales Co.	537-540
Hauserman Co., E. F.	513-516
Inland Steel Products Co.	424
Johns-Manville	542, 543
Sprayed Insulation, Inc.	544

**Sound & Silent Motion Picture Equipment (see Projectors)****Sound Systems**

Radio Corp. of America	623-626
Select-O-Phone Div., Kellogg Switchboard & Supply Co.	634

**Soups, Prepared**

Sexton & Co.	694, 695
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**Speakers, Loud**

Graybar Electric Co., Inc.	613
Radio Corp. of America	623-626

**Spectrographs**

Bausch & Lomb Optical Co.	746, 747
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**Speech Recording Equipment**

Brush Development Co.	632
Ediphone-Thomas A. Edison, Inc.	648
Presto Recording Corp.	633
Radio Corp. of America	623-626

**Spices**

Sexton & Co.	694, 695
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**Sports Timing Equipment**

Graybar Electric Co., Inc.	613
International Business Machines Corp.	614, 649
Medart Products, Inc.	834, 835
Montgomery Mfg. Co.	615
Standard Electric Time Co.	607-610

**Spotlights**

Art Craft Theatre Equipment Co.	676
Capitol Stage Lighting Co.	678
Kliegl Bros. Universal Electric Stage Lighting Co., Inc.	681
Knoxville Scenic Studios	682
Mitchell Industries, Hubert	683
Northwest Studios, Inc.	685
Pittsburgh Stage & Equipment Studios	687

**Sprayers, Tree & Shrub**

Breuer Electric Mfg. Co.	849
Gravely Motor Plow & Cultivator Co.	868

**Sprinklers, Automatic Fire**

Grinnell Company	585
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**Sprinkling Systems, Athletic Field**

March Automatic Irrigation Co.	866
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**Stacks, Library**

Art Metal Construction Co.	659-666
Berger Mfg. Div., Republic Steel Corp.	813
Globe-Wernicke Co.	670, 671
Interior Steel Equipment Co.	814
Penn Metal Corp. of Penna.	820, 821
Remington Rand Inc.	653-657

Snead & Co.	658
Standard Steel Equipment Co., Inc.	815
Universal Steel Equipment Corp.	667

**Stadium Seat Brackets**

Stewart Iron Works Co.	879
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**Stadium Seating (see Bleachers & Grandstands)****Stage Curtains (see Curtains & Draperies)****Stage Equipment, Electrical**

Art Craft Theatre Equipment Co.	676
Automatic Devices Co.	677
Capitol Stage Lighting Co.	678
Clancy, Inc.	679
Grash & Sons Scenic Studios	680
Kliegl Bros. Universal Electric Stage Lighting Co., Inc.	681
Knoxville Scenic Studios	682
Mitchell Industries, Hubert	683
Mork-Green Studios, Inc.	684
Northwest Studios, Inc.	685
Novelty Scenic Studios, Inc.	686
Pittsburgh Stage & Equipment Studios	687
Twin City Scenic Company	688
Volland Studios	689

**Stage Equipment, Rigging & Hardware**

Art Craft Theatre Equipment Co.	676
Automatic Devices Co.	677
Clancy, Inc.	679
Grash & Sons Scenic Studios	680
Knoxville Scenic Studios	682
Mitchell Industries, Hubert	683
Mork-Green Studios, Inc.	684
Northwest Studios, Inc.	685
Novelty Scenic Studios, Inc.	686
Pittsburgh Stage & Equipment Studios	687
Twin City Scenic Company	688
Volland Studios	689

**Stage Lighting Apparatus & Supplies**

Art Craft Theatre Equipment Co.	676
Capitol Stage Lighting Co.	678
Clancy, Inc.	679
Kliegl Bros. Universal Electric Stage Lighting Co., Inc.	681
Knoxville Scenic Studios	682
Mitchell Industries, Hubert	683
Northwest Studios, Inc.	685
Novelty Scenic Studios, Inc.	686
Pittsburgh Stage & Equipment Studios	687
Volland Studios	689

**Stage Scenery**

Art Craft Theatre Equipment Co.	676
Clancy, Inc., J. R.	679
Grash & Sons Scenic Studios	680
Knoxville Scenic Studios	682
Mitchell Industries, Hubert	683
Mork-Green Studios, Inc.	684
Northwest Studios, Inc.	685
Novelty Scenic Studios, Inc.	686
Pittsburgh Stage & Equipment Studios	687
Twin City Scenic Company	688
Volland Studios	689

**Stair Treads, Safety**

Alberene Stone Corp. of Va.	420
American Abrasive Metals Co.	479
American Floor Products Co.	502

American Mason Safety Tread Co.	480
Moulding Floor Mfg. Co.	490, 491
Safe Tread Co.	493-496
Servicised Products Corp.	497
Stancel Asphalt & Bitumuls Co. & American Bitumuls Co.	873
Wooster Products, Inc.	500, 501

**Stands, Curtain Machine**

Automatic Devices Co.	677
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**Stands, Projector**

Bausch & Lomb Optical Co.	628, 629
Howe Folding Furniture Inc.	646
Squibb-Taylor, Inc.	634A

**Stands, Tool**

Black & Decker Mfg. Co.	796
Lyon Metal Products, Inc.	816, 817
Millers Falls Co.	793
SkilSaw, Inc.	798
Standard Pressed Steel Co.	787

**Stands & Platforms, Folding**

Clancy, Inc.	679
Horn Brothers Company	826, 827
Mitchell Industries, Hubert	683
Mitchell Manufacturing Co.	647
Safway Steel Products, Inc.	836

**Steam Cookers**

Cleveland Range Co.	709
Market Forge Co.	711

**Steam Mains**

Durant Insulated Pipe Co.	581
Ric-wil Co.	582

**Steam Tables**

Blickman, Inc.	707
Duke Mfg. Co.	710
Straus-Duparquet, Inc.	712
Van Range Co.	713

**Steel Cabinets & Lockers**

All-Steel Equipment Inc.	672; 810, 811
Aurora Steel Products Company	812
Austral Sales Corp.	401-412
Berger Mfg. Div., Republic Steel Corp.	813
Interior Steel Equipment Co.	814
Kewaunee Mfg. Co.	728, 729
Lane Co., Chas. J.	675
Lyon Metal Products, Inc.	816, 817
Medart Products, Inc.	818, 819
Metal Office Furniture Co.	673
Nelson Company, Inc., A. R.	524
Penn Metal Corporation of Penna.	820, 821
Remington Rand Inc.	653-657
Standard Pressed Steel Co.	787
Standard Steel Equipment Co., Inc.	815

**Steel Flagpoles (see Flagpoles)****Steel Grandstands (see Grandstands)****Steel Roof Construction (see Roof Arches & Construction)****Steel Structures, Permanent & Temporary**

Blaw-Knox Div., Blaw-Knox Co.	418
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**Stereopticons**

Bausch & Lomb Optical Co.	746, 747
Capitol Stage Lighting Co.	678

**Stokers, Automatic**

Crane Co.	587
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**Stone, Architectural**

Alberene Stone Corp. of Va. .... 420  
Mosaic Tile Company .....469-472

**Stoneware, Acid Resisting**

Alberene Stone Corp. of Va. .... 745  
General Ceramics & Steatite Corp. .... 750  
Kewaunee Mfg. Co. ....728, 729  
Knight, Maurice A. ....755-758  
Laboratory Furniture Co., Inc. ....762, 763  
Metalab Equipment Corp. .... 767  
United States Stoneware Co. .... 766

**Stools**

Lyon Metal Products, Inc. ....816, 817  
Standard Pressed Steel Co. .... 787

**Storage Batteries**

Electric Storage Battery Co. .... 612  
Graybar Electric Co., Inc. .... 613

**Stoves (See Ranges)****Street Lights**

American Concrete Corporation ..... 589  
Graybar Electric Co., Inc. .... 613  
Schwerd Manufacturing Co. .... 421

**Structural Tile**

Mosaic Tile Company .....469-472  
National Fireproofing Corp. .... 473

**Student Record Reproduction Equipment (see Photoreproduction Equipment)****Student Records**

Art Metal Construction Co. ....659-666  
Diebold, Inc. ....668, 669  
Globe-Wernicke Co. ....670, 671  
International Business Machines Corp. 614; 649

**Sumps & Catch Basins, Acid Resisting**

Alberene Stone Corp. of Va. .... 745  
General Ceramics & Steatite Corp. .... 750  
Knight, Maurice A. ....755-758  
United States Stoneware Co. .... 766

**Surfacers, Belt and Disc**

Porter-Cable Machine Co. ....797; 859  
SkilSaw, Inc. .... 798  
Walker-Turner Div., Kearney & Trecker Corp. ....804, 805

**Surfacing Tennis Courts, Walks, etc.**

Stancel Asphalt & Bitumuls Co. & American Bitumuls Co. .... 873  
Barrett Div., Allied Chemical & Dye Corp. 428

**Sweepers, Power**

Modern Manufacturing Co. .... 870  
Wilshire Powersweeper Co. .... 871

**Swimming Pool Equipment**

American Playground Device Co. ...842, 843  
General Playground Equipment Inc. .... 845  
Hussey Mfg. Co., Inc. .... 830  
Recreation Equipment Co. .... 846

**Swimming Pool Lighting (see Underwater Lighting)****Swimming Pool Sanitation Systems**

Mathieson Chemical Corp. .... 823  
Spencer Turbine Co. .... 862  
Wallace & Tiernan Co., Inc. .... 824

**Swings**

American Playground Device Co. ...842, 843  
Burke Co. .... 844

General Playground Equipment Inc. .... 845  
Recreation Equipment Co. .... 846

**Switchboards, Laboratory**

General Electric Co. ....777-783  
Standard Electric Time Co. ....607-610  
Westinghouse Electric Corp. ....768-771

**Switchboards, Telephone**

North Electric Mfg. Co. ....603-606  
Standard Electric Time Co. ....607-610

**Switches**

General Electric Co. ....777-783  
Graybar Electric Co., Inc. .... 613

**Syrups, Fountain**

Sexton & Co. ....694, 695

**Table Linens (see Linens)****Table Tops (see Tops, Counter & Table)****Tables**

All-Steel Equipment Inc. .... 672  
American Playground Device Co. ...842, 843  
American Seating Co. ....639-642  
Art Metal Construction Co. ....659-666  
Bavinco Manufacturing Corp. .... 730  
Berger Mfg. Div., Republic Steel Corp. .. 813  
Brewer-Titchener Corp. .... 645  
Hercules Food Service Equipment Inc. .. 698  
Heywood-Wakefield Company .... 643  
Howe Folding Furniture, Inc. .... 646  
Irwin Seating Co. .... 622  
Laboratory Furniture Co., Inc. ....762, 763  
Mitchell Mfg. Co. .... 647  
Norcor Mfg. Co. .... 644  
Remington Rand Inc. ....653-657  
Simmons Co. ....724, 725  
Snead & Co. .... 658  
Straus-Duparquet, Inc. .... 712  
Superior Sleeprite Corp. ....726, 727  
Universal Equipment Co. .... 723

**Tables, Art & Drafting**

Interior Steel Equipment Co. .... 814  
Lyon Metal Products, Inc. ....816, 817

**Tables, Banquet (see Banquet Tables)****Tables, Cafeteria**

American Seating Co. ....639-642  
Howe Folding Furniture, Inc. .... 646  
Mitchell Mfg. Co. .... 647  
Schieber Mfg. Co. ....522, 523  
Straus-Duparquet, Inc. .... 712  
Universal Equipment Co. .... 723

**Tables, Folding**

Brewer-Titchener Corp. .... 645  
Howe Folding Furniture, Inc. .... 646  
Mitchell Mfg. Co. .... 647  
Norcor Mfg. Co. .... 644  
Schieber Mfg. Co. ....522, 523  
Standard Pressed Steel Co. .... 787

**Tables, Kitchen**

Hercules Food Service Equipment, Inc. .. 698  
Mutschler Brothers Co. ....703-706  
Straus-Duparquet, Inc. .... 712  
Wood-Metal Industries, Inc. .... 743

**Tables, Laboratory & Shop**

Kewaunee Mfg. Co. ....728, 729  
Laboratory Furniture Co., Inc. ....762, 763

Lyon Metal Products, Inc. ....816, 817  
National Store Fixture Co. ....719-722  
Penn Metal Corp. of Penna. ....820, 821  
Standard Pressed Steel Co. .... 787

**Tables, Sewing Room (see Sewing Room Equipment)****Tables, Steam (see Steam Tables)****Tablet Arm Chairs**

American Seating Co. ....639-642  
Heywood-Wakefield Co. .... 643  
Irwin Seating Co. .... 622  
Norcor Mfg. Co. .... 644

**Tablets, Memorial**

International Bronze Tablet Co., Inc. ... 464  
Matthews & Co., Jas. H. .... 465  
Michaels Art Bronze Co., Inc. .... 467  
McGann & Sons Co. .... 466  
Stewart Iron Works Co. .... 879

**Tableware, Dishes**

Boonton Molding Company, .... 691  
Keyes Fibre Company .... 692  
Straus-Duparquet, Inc. .... 712

**Tableware, Silver**

International Silver Co. .... 690

**Tabulating & Sorting Machines**

International Business Machines Corp. 614; 649  
Remington Rand Inc. ....653-657

**Talking Motion Picture Equipment**

Ampro Corp. .... 627  
Bell & Howell Co. .... 630  
General Electric Co. ....777-783  
Radio Corp. of America ....623-626

**Tanks, Acid & Chemical Resistant**

Alberene Stone Corp. of Va. .... 745  
Duriron Co., Inc. .... 749  
General Ceramics & Steatite Corp. .... 750  
Knight, Maurice A. ....755-758  
Laboratory Furniture Co., Inc. ....762, 763  
Metalab Equipment Corp. .... 767  
United States Stoneware Co. .... 766

**Tape Recorders**

Brush Development Co. .... 632  
Presto Recording Corp. .... 633

**Tape-Rules & Measuring Tapes**

Lufkin Rule Co. .... 792  
Millers Falls Co. .... 793  
Starrett Co. .... 795

**Tea**

Sexton & Co. ....694, 695

**Teaching Aids, Films & Textbooks**

American Type Founders Sales Corp. 788, 789  
General Chemical Div., Allied Chemical & Dye Corp. .... 759  
General Electric Co. ....777-783  
Leeds & Northrup Co. ....764, 765  
Lufkin Rule Co. .... 792  
Radio Corp. of America ....623-626  
Stanley Tools .... 794  
Starrett Co. .... 795

**Telephone Systems**

Graybar Electric Co., Inc. .... 613  
North Electric Mfg. Co. ....603-606  
Standard Electric Time Co. ....607-610

**Television Sets & Kits**

Radio Corp. of America .....623-626  
Sylvania Electric Products ..... 602

**Television Studio Equipment**

Clancy, Inc. .... 679

**Temperature Indicating Instruments**

Johnson Service Co. .... 568  
Leeds & Northrup Co. ....764, 765  
Weston Electrical Instrument Corp. ....773-776

**Temperature Regulation Systems**

Johnson Service Co. .... 568  
Nelson Corp., Herman ..... 562  
Nesbitt, Inc. ....557-560  
Trane Co. ....564-565  
Warren Webster & Co. ....566, 567

**Tennis Court Backstops**

Anchor Post Products, Inc. .... 874  
Colorado Fuel & Iron Corp., Wickwire  
Spencer Steel Div. .... 875  
Cyclone Fence Div., American Steel &  
Wire Co. .... 877  
Pittsburgh Steel Co. .... 878  
Stewart Iron Works Co. .... 879

**Tennis Court Resurfacing (see  
Surfacing Tennis Courts, etc.)**

**Tennis, Volley Ball, Badminton, Nets**  
American Playground Device Co. ....842, 843

**Terminal Posts**

Anchor Post Products, Inc. .... 874  
Colorado Fuel & Iron Corp., Wickwire  
Spencer Steel Div. .... 875  
Continental Steel Corp. .... 876  
Cyclone Fence Div., American Steel &  
Wire Co. .... 877  
Pittsburgh Steel Co. .... 878  
Stewart Iron Works .... 879

**Termite Control**

West Disinfecting Co. .... 860

**Testing Equipment, Electrical (see Elec-  
trical Measuring Instruments)****Test Scoring Machines**

International Business Machines Corp. 614; 649

**Test Tubes**

Corning Glass Works .... 748

**Textbook Bindings**

Du Pont de Nemours & Co., Inc. ....904, 905

**Theatrical Equipment**

Art Craft Theatre Equipment Co. .... 676  
Automatic Devices Co. .... 677  
Capitol Stage Lighting Co. .... 678  
Clancy, Inc. .... 679  
Grash & Sons Scenic Studios ..... 680  
Kliegl Bros. Universal Electric Stage Light-  
ing Co., Inc. .... 681  
Knoxville Scenic Studios ..... 682  
Mitchell Industries, Hubert ..... 683  
Mork-Green Studios, Inc. .... 684  
Northwest Studios, Inc. .... 685  
Novelty Scenic Studios, Inc. .... 686  
Pittsburgh Stage & Equipment Studios .. 687  
Twin City Scenic Company ..... 688  
Volland Studios ..... 689

**Thermocouples**

Leeds & Northrup Co. ....764, 765  
Weston Electrical Instrument Co. ....773-776

**Thermometers, Electrical Resistance**

Weston Electrical Instrument Co. ....773-776

**Thermostats**

Johnson Service Co. .... 568  
Warren Webster & Co. ....566, 567

**Thresholds (see Sills, Door &  
Window)****Tile, Acoustical**

Celotex Corp. .... 541  
Dant & Russell Sales Co. ....537-540  
Johns-Manville .....542, 543

**Tile, Asphalt**

Johns-Manville .....542, 543  
Kennedy, Inc., David E. ....485-488  
Moulding Floor Mfg. Co. ....490, 491  
Tile-Tex Co., Inc. ....475-478

**Tile, Drain Foundation**

Ric-wil Co. .... 582

**Tile, Glazed (see Glazed Tile)****Tile, Structural (see Structural Tile)****Tile, Wall**

Johns-Manville .....542, 543  
Kennedy, Inc., David E. ....485-488  
Mosaic Tile Company .....469-472  
Moulding Floor Mfg. Co. ....490, 491  
National Fireproofing Corp. .... 473  
Tile-Tex Co., Inc. ....475-478  
United States Quarry Tile Co. .... 474

**Tile Cleaner**

Consolidated Laboratories ..... 851  
Hillyard Sales Companies .....854, 855

**Tile Flooring (see Flooring, Tile)****Time Recorders, Stamps & Timekeeping  
Systems**

International Business Machines Corp. 614; 649  
Montgomery Mfg. Co. .... 615  
Standard Electric Time Co. ....607-610

**Timers, Electric Sports**

International Business Machines Corp. 614; 649  
Standard Electric Time Co. ....607-610

**Toasters, Electric**

General Electric Co. ....731-742

**Toilet Tissue & Towel Fixtures (see  
Washroom Equipment)****Tool Sets, Student (see Tools, Hand)****Tool Storage Equipment**

Berger Mfg. Div., Republic Steel Corp. .. 813  
Lyon Metal Products, Inc. ....816, 817  
Penn Metal Corporation of Penna....820, 821  
Standard Pressed Steel Co. .... 787  
Standard Steel Equipment Co., Inc. .... 815  
Universal Steel Equipment Corp. .... 667

**Tools & Cutters, Shop**

Brown & Sharpe Mfg. Co. ....790; 801  
Cincinnati Milling Machine Co., Cincin-  
nati Grinders, Inc. .... 903  
Kearney & Trecker Corp. ....899-902

**Tools, Electric**

American Floor Surfacing Machine Co... 848  
Black & Decker Mfg. Co. .... 796  
Clarke Sanding Machine Co. .... 850  
Graybar Electric Co., Inc. .... 613

Millers Falls Co. .... 793  
Porter-Cable Machine Co. ....797; 859  
SkilSaw, Inc. .... 798  
Stanley Electric Tools ..... 799

**Tools, Hand**

Black & Decker Mfg. Co. .... 796  
Brown & Sharpe Mfg. Co. ....790; 801  
Clarke Sanding Machine Co. .... 850  
Greenlee Tool Co. .... 791  
Lufkin Rule Co. .... 792  
Millers Falls Co. .... 793  
Porter-Cable Machine Co. ....797; 859  
SkilSaw, Inc. .... 798  
Stanley Tools ..... 794  
Starrett Co. .... 795  
Walker-Turner Div., Kearney & Trecker  
Corp. ....804, 805

**Tools, Machine**

Atlas Press Co. .... 784  
Black & Decker Mfg. Co. .... 796  
Brown & Sharpe Mfg. Co. ....790; 801  
Clarke Sanding Machine Co. .... 850  
King Machine Tool Div., American Steel  
Foundries ..... 800  
Logan Engineering Co. .... 303  
Millers Falls Co. .... 793  
Porter-Cable Machine Co. ....797; 859  
Stanley Electric Tools ..... 799  
Walker-Turner Div., Kearney & Trecker  
Corp. ....804, 805

**Tools, Precision**

Lufkin Rule Co. .... 792  
Millers Falls Co. .... 793  
Porter-Cable Machine Co. ....797; 859  
Sexauer Mfg. Co., Inc. .... 864  
SkilSaw, Inc. .... 798  
Starrett Co. .... 795

**Tops, Counter & Table**

Alberene Stone Corp. of Va. .... 745  
Blickman, Inc., S. .... 707  
Duke Mfg. Co. .... 710  
Formica Co. ....715, 716  
Hercules Food Service Equipment, Inc. .. 698  
Kewaunee Mfg. Co. ....728, 729  
Metalab Equipment Corp. .... 767  
National Store Fixture Co. ....719-722  
Straus-Duparquet, Inc. .... 712  
United States Plywood Corp. .... 463

**Towels, Paper**

West Disinfecting Co. .... 860

**Towers, Floodlight, Radio,  
Maintenance**

Safway Steel Products, Inc. .... 836  
Truscon Steel Company .....422, 423

**Tracks for Doors**

Stanley Works ..... 526

**Tractors & Trucks**

Gravely Motor Plow & Cultivator Co. ... 868

**Transcription Reproducers**

Brush Development Co. .... 632  
Presto Recording Corp. .... 633  
Radio Corp. of America .....623-626

**Transformers**

General Electric Co. ....777-783  
Graybar Electric Co., Inc. .... 613



Leeds & Northrup Co. ....764, 765  
 Montgomery Mfg. Co. .... 615  
 Westinghouse Electric Corp. ....768-771  
 Weston Electrical Instrument Corp. ....773-776

**Tray Covers, Linen & Paper**

Sexton & Co. ....694, 695

**Trays, Dish**

Aluminum Cooking Utensil Co. .... 717  
 Boonton Molding Company .... 691  
 Keyes Fibre Co. .... 692

**Treads, Safety Stair & Floor**

Alberene Stone Corp. of Va. .... 420  
 American Abrasive Metals Co. .... 479  
 American Floor Products Co. .... 502  
 American Mason Safety Tread Co. .... 480  
 Cutcrete Corp. .... 620  
 Moulding Floor Mfg. Co. ....490, 491  
 Safe Tread Co. ....493-496  
 Serviced Products Corp. .... 497  
 Stancal Asphalt & Bitumuls Co. & American Bitumuls Co. .... 873  
 Wooster Products, Inc. ....500, 501

**Trophies, Cups & Medals**

International Bronze Tablet Co., Inc. .... 464

**Troughs, Chalkboard & Laboratory**

Alberene Stone Corp. of Va. .... 745  
 Austral Sales Corp. ....401-412  
 Claridge Products, Inc. .... 527  
 Duriron Co., Inc. .... 749  
 General Ceramics & Steatite Corp. .... 750  
 Inland Steel Products Co. .... 424  
 Knight, Maurice A. ....755-758  
 Laboratory Furniture Co., Inc. ....762, 763  
 Metalab Equipment Corp. .... 767  
 United States Stoneware Co. .... 766

**Trucks (see Tractors & Trucks)****Trucks, Book, Chair, etc.**

Art Metal Construction Co. ....659-666  
 Brewer-Titchener Corp. .... 645  
 Kewaunee Mfg. Co. ....728, 729  
 Snead & Co. .... 658

**Trucks, Food Service**

Blickman, Inc. .... 707  
 Straus-Duparquet, Inc. .... 712  
 Van Range Co. .... 713

**Tubes, Electron & Radio**

General Electric Co. ....777-783  
 Radio Corp. of America ....623-626  
 Sylvia Electric Products .... 602

**Tubes, Tubing, Glass**

Corning Glass Works .... 748

**Tubing, Plastic**

United States Stoneware Co. .... 766

**Tubs, Acid-Resisting**

Alberene Stone Corp. of Va. .... 745  
 Duriron Co., Inc. .... 749  
 General Ceramics & Steatite Corp. .... 750  
 Knight, Maurice A. ....755-758  
 Metalab Equipment Corp. .... 767  
 United States Stoneware Co. .... 766

**Type, Printing**

American Type Founders Sales Corp. ....788, 789

**Typewriter Desks & Tables**

Howe Folding Furniture, Inc. .... 646  
 Remington Rand Inc. ....653-657

**Typewriters**

International Business Machines Corp. ....614, 649  
 Remington Rand Inc. ....653-657  
 Underwood Corp. ....650, 651

**Ultra-Violet Irradiators**

Graybar Electric Co., Inc. .... 613

**Underwater Lighting (see Lighting, Underwater)****Unit Ventilation**

Nelson Corp., Herman .... 562  
 Nesbitt, Inc. ....557-560  
 Trane Co. ....564, 565  
 Vulcan Radiator Co. .... 563

**Urinals**

Crane Co. .... 587

**Urns, Coffee (see Coffee Urns)****Utensils, Range (see Cooking Equipment & Utensils)****Vacuum Cleaners for Chalkboard Erasers**

Spencer Turbine Co. .... 862

**Vacuum Cleaners, Wet & Dry**

Black & Decker Mfg. Co. .... 796  
 Breuer Electric Mfg. Co. .... 849  
 Clarke Sanding Machine Co. .... 850  
 Consolidated Laboratories .... 851  
 General Electric Co. .... 861  
 Hillyard Sales Companies ....854, 855  
 Kent Co., Inc. .... 857  
 Lincoln-Schlueter Floor Machinery Co., Inc. ....858  
 Spencer Turbine Co. .... 862

**Vacuum Cleaning Systems**

Breuer Electric Mfg. Co. .... 849  
 General Electric Co. .... 861  
 Kent Company .... 857  
 Lincoln-Schlueter Floor Machinery Co., Inc. ....858  
 Spencer Turbine Co. .... 862

**Vacuum Pumps (see Pumps, Vacuum & Pressure)****Valve Reconditioning Equipment**

Black & Decker Mfg. Co. .... 796  
 Sexauer Mfg. Co., Inc. .... 864

**Valves, Flush, Relief & Safety**

Crane Co. .... 587  
 Symmons Engineering Co. .... 588

**Varnish**

Empire Varnish Co. .... 852  
 Hillyard Sales Companies ....854, 855

**Vaults**

Diebold, Inc. ....668, 669  
 Mosler Safe Co. .... 674

**Vending Machines, Popcorn**

Manley, Inc. ....887-890

**Vending Machines, Sanitary Napkin**

West Disinfecting Co. .... 860

**Venetian Blinds**

Columbia Mills, Inc. .... 616  
 Hunter Douglas Corp. ....449-456  
 Levolor Lorentzen, Inc. ....457-460  
 Lindemann Company, Carl .... 618

**Ventilating Pipe & Fittings**

Crane Co. .... 587  
 Duriron Co., Inc. .... 749  
 General Ceramics & Steatite Corp. .... 750  
 Johnson Service Co. .... 568  
 Knight, Maurice A. ....755-758  
 Laboratory Furniture Co., Inc. ....762, 763  
 Metalab Equipment Corp. .... 767  
 United States Stoneware Co. .... 766  
 Warren Webster & Co. ....566, 567

**Ventilating Units**

Gannon Co. .... 545  
 Nelson Corp., Herman .... 562  
 Nesbitt, Inc. ....557-560  
 Trane Co. ....564, 565  
 Vulcan Radiator Co. .... 563

**Ventilators, Power & Roof**

American 3 Way-Luxfer Prism Co. ....571-578  
 Hirschman-Pohle Co., Inc. .... 579  
 Knight, Maurice A. ....755-758  
 Swartwout Company .... 580

**Vises**

Brown & Sharpe Mfg. Co. ....790; 801

**Visible Record Forms and Equipment**

Art Metal Construction Co. ....659-666  
 Diebold, Inc. ....668, 669  
 Globe-Wernicke Co. ....670, 671  
 Remington Rand Inc. ....653-657

**Visual Aids (see Teaching Aids, Texts & Films)****Voltage Regulators (see Dimmers)****Voltmeters (see Meters, Electric)****Waffle Grill**

Hotpoint, Inc. ....699-702

**Wainscoting**

Alberene Stone Corp. of Va. .... 420  
 Formica Co. ....715, 716  
 Hauserman Co., E. F. ....513-516  
 Kennedy, Inc., David E. ....485-488  
 Martin-Parry Corp. ....517-520  
 Mosaic Tile Co. ....469-472  
 Moulding Floor Mfg. Co. ....490, 491  
 National Fireproofing Corp. .... 473  
 United States Quarry Tile Co. .... 474

**Walks, Pavements, Treading, etc. (see Pavements, Walks, etc.)****Wall Clocks (see Clocks)****Wall Fixtures (see Lighting Fixtures)****Wall Tile (see Tile, Wall)****Walls, Glass Block for**

American Structural Products Co. .... 445  
 Pittsburgh Corning Corp. ....446, 447

**Walls, Movable (see Partitions, Folding, Movable)****Wardrobe Hardware**

Austral Sales Corp. ....401-412  
 Nelson Co., Inc., A. R. .... 524  
 Richards-Wilcox Mfg. Co. .... 525  
 Stanley Works .... 526

**Wardrobes**

All-Steel Equipment Inc. ....672; 810, 811  
 Aurora Steel Products Company .... 812

- Austral Sales Corp. ....401-412  
 Berger Mfg. Div., Republic Steel Corp. .. 813  
 Interior Steel Equipment Co. .... 814  
 Lyon Metal Products, Inc. ....816, 817  
 Medart Products, Inc. ....818, 819  
 Mutschler Brothers Co. ....703-706  
 Nelson Company, Inc., A. R. .... 524  
 Penn Metal Corporation of Penna. ..820, 821  
 Richards-Wilcox Mfg. Co. .... 525  
 Standard Steel Equipment Co., Inc. .... 815
- Washroom Equipment & Supplies**  
 Alberene Stone Corp. of Va. .... 420  
 Consolidated Laboratories .... 851  
 Crane Co. .... 587  
 Electric-Aire Engineering Corp. .... 822  
 Hillyard Sales Companies ....854, 855  
 Mosaic Tile Company ....469-472  
 Symmons Engineering Co. .... 588  
 United States Plywood Corp. .... 463  
 United States Quarry Tile Co. .... 474  
 West Disinfecting Co. .... 860
- Waste Disposers**  
 General Electric Co. ....731-742  
 Sargent Building Specialties Co. .... 583  
 Washburn & Granger, Inc. .... 584
- Waste Receptacles**  
 National Vulcanized Fibre Co. .... 863  
 West Disinfecting Co. .... 860
- Water Closet Cleaners**  
 Consolidated Laboratories .... 851  
 Hillyard Sales Companies ....854, 855  
 Sexauer Mfg. Co., Inc. .... 864  
 West Disinfecting Co. .... 860
- Water Closets**  
 Crane Co. .... 587
- Water Fountains**  
 Crane Co. .... 587  
 Taylor Co. .... 586
- Water Heaters**  
 General Electric Co. ....731-742  
 Petroleum Heat & Power Co. ....546, 547
- Waterproofing**  
 Barrett Div. Allied Chemical & Dye Corp 428  
 Empire Varnish Co. .... 852  
 Hillyard Sales Companies ....854, 855  
 Serviced Products Corp. .... 497  
 Standard Dry Wall Products ....505-508  
 Structural Waterproofing Corp. .... 503  
 Western Watereproofing Companies ..509-512  
 Western Waterproofing Co. .... 504
- Water Purification**  
 Mathieson Chemical Corp. .... 823  
 Wallace & Tiernan Co., Inc. .... 824
- Water Sport Devices**  
 American Playground Device Co. ...842, 843  
 General Playground Equipment Inc. .... 845  
 Hussey Mfg. Co., Inc. .... 830  
 Recreation Equipment Co. .... 846
- Wattmeters (see Meters, Electric)**
- Waxes, Floor**  
 Fuller Brush Co. .... 853  
 Hillyard Sales Companies ....854, 855  
 Moulding Floor Mfg. Co. ....490, 491  
 West Disinfecting Co. .... 860
- Waxing Machines, Electric**  
 Advance Floor Machine Co. .... 847  
 American Floor Surfacing Machine Co. .. 848  
 Breuer Electric Mfg. Co. .... 849  
 Clarke Sanding Machine Co. .... 850  
 Consolidated Laboratories .... 851  
 General Floorcraft, Inc. .... 856  
 Hillyard Sales Companies .... 854, 855  
 Kent Co., Inc. .... 857  
 Lincoln-Schlueter Floor Machinery Co., Inc. 858
- Weatherproofing**  
 Standard Dry Wall Products ....505-508  
 Structural Waterproofing Corp. .... 503  
 Western Waterproofing Companies ..509-512  
 Western Waterproofing Co. .... 504
- Weather Stripping**  
 Accurate Metal Weather Strip Co., Inc.... 468
- Winches**  
 Clancy, Inc. .... 679  
 Thompson Electric Co. .... 611
- Window Cleaners (see Glass Cleaners)**
- Window Curtains & Draperies (see Curtains & Draperies)**
- Window Frames for Glass Block**  
 Storms & Co., Albert .... 441
- Window Guards, Iron & Wire Mesh**  
 Cornell Iron Works, Inc. .... 461  
 Kinnear Mfg. Co. .... 462  
 Stewart Iron Works Co. .... 879
- Window Operating Devices**  
 Adams & Westlake Co. ....433-436  
 Austral Sales Corp. ....401-412  
 Bayley Co., William ....442, 443  
 Flynn Mfg. Co., Michael ....437-440  
 Gate City Sash and Door Co. .... 431  
 Sterling Windows, Inc. .... 452  
 Truscon Steel Company ....422, 423  
 Universal Window Co. .... 444
- Window Shades**  
 Columbia Mills, Inc. .... 616  
 Columbus Coated Fabrics Corp. .... 619  
 Draper Shade Co. .... 617  
 Du Pont de Nemours & Co., Inc. ....904, 905  
 Lindemann Company .... 618
- Window Sills (see Sills, Door & Window)**
- Windows, Aluminum (see Aluminum Double Hung Windows)**
- Windows, Awning & Projected Type**  
 Adams & Westlake Co. ....433-436  
 Austral Sales Corp. ....401-412  
 Bayley Co., William ....442, 443  
 Flynn Mfg. Co., Michael ....437-440  
 Gate City Sash and Door Co. .... 431  
 Sterling Windows, Inc. .... 432  
 Storms & Co., Albert .... 441  
 Truscon Steel Company ....422, 423  
 Universal Window Co. .... 444
- Windows, Double-Hung**  
 Adams & Westlake Co. ....433-436  
 Bayley & Co., William ....442, 443
- Flynn Mfg. Co., Michael ....437-440  
 Sterling Windows, Inc. .... 432  
 Truscon Steel Company ....422, 423  
 Universal Window Co. .... 444
- Windows, Glass Block for**  
 American Structural Products Co. .... 445  
 Pittsburgh Corning Corp. ....446, 447
- Windows, Intermediate Casement**  
 Adams & Westlake Co. ....433-436  
 Storms & Co., Albert .... 441  
 Truscon Steel Co. ....422, 423  
 Universal Window Co. .... 444
- Windows, Metal-Framed**  
 Adams & Westlake Co. ....433-436  
 Bayley Co., William ....442, 443  
 Flynn Mfg. Co., Michael ....437-440  
 Inland Steel Products Co. .... 424  
 Michaels Art Bronze Co., Inc. .... 467  
 Sterling Windows, Inc. .... 432  
 Storms & Co., Albert .... 441  
 Truscon Steel Company ....422, 423  
 Universal Window Co. .... 444
- Wire, Barbed**  
 Colorado Fuel & Iron Corp., Wickwire  
 Spencer Steel Div. .... 875  
 Continental Steel Corp. .... 876  
 Pittsburgh Steel Co. .... 878
- Wire Enclosures**  
 Anchor Post Products, Inc. .... 874  
 Colorado Fuel & Iron Corp., Wickwire  
 Spencer Steel Div. .... 875  
 Continental Steel Corp. .... 876  
 Cyclone Fence Div., American Steel &  
 Wire Co. .... 877  
 Pittsburgh Steel Co. .... 878  
 Stewart Iron Works .... 879
- Wire Gymnasium Baskets (see Baskets, Wire)**
- Wire Recorders (Voice)**  
 Radio Corp. of America ....623-626
- Wires & Wiring Installations**  
 General Electric Co. ....777-783  
 Sylvania Electric Products .... 602
- Wood Columns**  
 Schwerdt Mfg. Co. .... 421
- Wood Flooring**  
 Jennison-Wright Corporation ....481-484  
 Maple Flooring Manufacturers Assn. .... 489  
 Storm Flooring Co. ....498, 499
- Woodworking Machinery**  
 Atlas Press Co. .... 784  
 Stanley Electric Tools .... 799  
 Starrett Co. .... 795  
 Walker-Turner Div., Kearney & Trecker  
 Corp. ....804, 805
- Work Benches**  
 Berger Mfg. Div., Republic Steel Corp. ... 813  
 Interior Steel Equipment Co. .... 814  
 Kewaunee Mfg. Co. ....728, 729  
 Laboratory Furniture Co., Inc. ....762, 763  
 Lyon Metal Products, Inc. ....816, 817  
 Metalab Equipment Corp. .... 767  
 Penn Metal Corp. of Penna. ....820, 821  
 Standard Pressed Steel Co. .... 787

## Distributors of Educational Equipment and Supplies

*Listing in this directory is restricted to regional distributors of educational furniture, equipment, materials and supplies who maintain at a warehouse or store, stocks of the principal lines they represent.*

### Region 1—New England States

**Apothecaries Hall Co.**<sup>3</sup>, 8 Benedict St., Waterbury 88, Conn.

**Edward E. Babb Company**<sup>1, 2</sup>, Div. of Milton Bradley Company, 17 Fordham Road, Boston 34, Mass.

Milton Bradley educational materials  
Playground Equipment  
Peabody Seating Company  
Ditto machines and supplies  
Complete school supply and equipment line

**Cambosco Scientific Co.**<sup>3</sup>, 37 Antwerp St., Boston, Mass.

**Cascade Paper Co.**, 114 Holden St., North Adams, Mass.

**Central Scientific Co.**<sup>3</sup>, 79 Amherst, Cambridge 42, Mass.

**The Claflin Co.**<sup>3</sup>, 40 Mathewson St., Providence 3, R. I.

**Doe & Ingalls, Inc.**<sup>3</sup>, Vine & Garden Sts., Boston, Mass.

**Eastern Scientific Co.**, 51 Bassett St., Providence, R. I.

**Gledhill Bros., Inc.**<sup>1, 2</sup>, 20 Chestnut Ave., Boston 30, Mass.

American Crayon Company  
Heywood-Wakefield school furniture  
Kewaunee laboratory equipment  
School supplies  
Wallace Pencil Company

**D. K. Hammett, Inc.**<sup>2</sup>, 620 Congress St., Portland, Maine

**J. L. Hammett Co.**<sup>1, 2</sup>, 290 Main St., Cambridge 42, Mass.

American Seating Co., school furniture  
Binney & Smith Co., Crayola and art materials  
Harbuts Plasticine  
Wayne Iron Works grandstands  
Weber Costello Co., Hyloplate, Sterling and Litesite chalkboards  
Audio-visual equipment and apparatus  
Blackboards  
Bulletin boards  
Composition and examination books  
Hand looms for weaving & occupational therapy material  
Diplomas and testimonials

**Howe & French, Inc.**<sup>3</sup>, 99 Broad St., Boston 10, Mass.

Complete stocks of laboratory apparatus and chemicals

**Jackson Chairs, Inc.**, 226 Park Square Bldg., Boston 16, Mass.

Howe Folding Furniture Inc., folding tables  
Norcor Mfg. Co., folding chairs  
Vogel-Peterson Co., checkroom equipment  
Folding chairs, steel and wood

**Jarrell-Ash Company**<sup>2, 3</sup>, 165 Newbury St., Boston 16, Mass.

**Macalaster Bicknell Co. of Conn.**, 181 Henry St., New Haven, Conn.

**E. F. Mahady Co.**<sup>3</sup>, 851 Boylston St., Boston 16, Mass.

General Laboratory Supplies  
Microscopes  
Kimble and Pyrex Glassware  
Chemicals and Stains

**McAuliffe Paper Co., Inc.**, Burlington, Vt.

American Playground Device Co.  
Arlington Seating Co.  
Horn Brothers Company (folding bleachers and partitions)  
Luther O. Draper Shade Company, window shades  
School supplies, art materials, sanitary equipment

**Mainco Trading Company**<sup>1</sup>, 31 Antwerp St., Boston 35, Mass.; and Kennebunkport, Maine

Joseph Dixon Crucible Company  
American Art Clay Company  
Arlington Seating Company

**The Papercrafters, Inc.**, 724 Main St., Holyoke, Mass.  
School supplies

**A. H. Rice Co., Inc.**<sup>2</sup>, 78 West Central St., Manchester, N. H.

**Visual Education Service, Inc.**<sup>2</sup>, 116 Newbury St., Boston 16, Mass.

Bell & Howell special representative and service station  
Complete line of audio-visual equipment and accessories

**Henry S. Wolkins Co.**<sup>1</sup>, 716 Columbus Avenue, Boston 20, Mass.

<sup>1</sup> Member National School Service Institute; <sup>2</sup> Member National Audio-Visual Association; <sup>3</sup> Laboratory Supply Distributor.



## Region 2—New York, New Jersey, Ontario, Canada

**Ace Scientific & Industrial Co.**<sup>3</sup>, 810 Broadway, New York 3, N. Y.

**Allied Equipment Corp.**, 10 Chambers St., Trenton, N. J.  
Wood table and chair units  
Irwin Seating Co., steel classroom desks  
Clarín steel folding chairs  
Jasper office desks and chairs

**American Seating Co.**<sup>1, 2</sup>, Empire State Division, 935 W. Genesee St., Syracuse 4, N. Y.

**Association Films, Inc.**, 35 West 45th St., New York, N. Y.  
Religious, Educational and Entertainment Film Distributors

**Bacon & Vincent Co., Inc.**<sup>1</sup>, 1 Ellicott St., Buffalo 3, N. Y.;  
971 Lexington Ave., New York 21, N. Y.

*Audio Visual Aids Department*

American Optical projectors and microscopes  
Beseler opaque and transparency projectors  
Cram maps, charts and globes  
Curriculum slidefilms  
Jam Handy instructional slidefilms  
Neumade audio-visual equipment  
Operadio projectors & recorders  
Popular Science slidefilm and records  
R. C. A. educational music record library  
Radiant projection screens and shadow boxes  
S. V. E. projectors, slidefilms and slides  
Symphonic players and turntables  
Vocational Guidance motion pictures and slidefilms

*Furniture & Contract Department*

Bavenco home economics equipment  
Burke playground and athletic equipment  
Draper window shades  
Gunlocke classroom seating furniture  
Hamilton laboratory and art room equipment  
Peabody classroom and auditorium seating  
Williams bleachers—gymnasium and out-door

*Supplies Department*

American Crayon art supplies and materials  
Beckley-Cardy chalk and cork boards and supplies  
Binney & Smith art supplies and materials  
Ditto duplicating machines, paper and supplies  
Educational playthings, games, puzzles for kindergartens  
School supplies and papers of all kinds  
Sifo Puzzles

**Bardeen's, Inc.**<sup>1</sup>, 543 East Genesee St., Syracuse 2, N. Y.

Art and handicraft products  
Class registers and school forms  
Playground and athletic equipment  
School supplies and equipment

**J. & H. Berge**<sup>3</sup>, 145 Hudson St., New York 13, N. Y.

**Biological Supply Co.**<sup>3</sup>, 1176 Mt. Hope Ave., Rochester 7, N. Y.

**Bovik and Crandall**<sup>2</sup>, 263 State St., Elmira, N. Y.

**Walter A. Braun Company**, 249 High St., Newark 2, N. J.; 227 Fulton St., New York 7, N. Y.

American Playground—apparatus playground equipment  
Clarín Manufacturing Co., folding chairs  
Dudley Lock Corp., combination locks  
Hussey Manufacturing Co., bleachers, grandstands  
Mitchell Manufacturing Co., folding tables, band stands  
Narragansett Machine Co. Gym & Backstop equipment  
Bennett Manufacturing Co., waste receptacles  
Steel lockers, shelving and cabinets

**Buchan Pictures**, 79 Allen St., Buffalo, N. Y.

**Buffalo Apparatus Corp.**<sup>3</sup>, 180 Main St., Buffalo, N. Y.

**Central Scientific Co.**, 441 Clinton Ave., Newark 8, N. J.

**Eimer & Amend**<sup>3</sup>, 633 Greenwich St., New York 14, N. Y.

**Fisher Scientific Co.**, 633 Greenwich St., New York, N. Y.

**Earl A. Fisher**, 71 Tompkins Ave., Mamaroneck, N. Y.

**General Laboratory Supply Co.**<sup>3</sup>, 320 Market St., Paterson, N. J.

**The Emil Greiner Co.**<sup>3</sup>, 161 Sixth Ave., New York, N. Y.

**Otto R. Greiner Co.**<sup>3</sup>, 221 High St., Newark 2, N. J.

**Hallenbeck & Riley**<sup>2</sup>, 562 Broadway, Albany 7, N. Y.

**J. L. Hammett Co.**<sup>1</sup>, 380 Jelliff Ave., Newark 8, N. J.

School Papers, Examination Books  
Art & Crafts materials, Kindergarten supplies  
Looms, Weaving supplies  
Ceramic and Modeling supplies  
Bulletin Boards, Blackboards, etc.

**Henry Division Central Scientific Company of Canada, Ltd.**, Toronto, Montreal and Vancouver

Distributors of stainless steel unit laboratory furniture  
C. T. S. classroom furniture, blackboards, kindergarten supplies, classroom materials, maps, charts and a complete service of educational equipment

**Bernard J. Hicks, Inc.**<sup>1</sup>, 1629 Burnett St., Brooklyn 29, N. Y.  
School furniture

**Jack Hood School Supplies**<sup>1</sup>, 91 Erie St., Stratford, Ontario, Canada

**Institutional Cinema Service, Inc.**<sup>2</sup>, 1560 Broadway, New York 19, N. Y.

Rental of 16mm entertainment films  
Visual aids service, specializing in educational films  
Film equipment, accessories, sound systems

**Long Island Institutional Equipment Co., Inc.**<sup>1, 2</sup>, 1501 Franklin Ave., Mineola, N. Y.

**Marks & Fuller, Inc.**, 332 E. Main St., Rochester, N. Y.

**Moyer School Supplies Limited**<sup>1</sup>, 106-108 York St., Toronto, Ontario, Canada

**New York Laboratory Supply Co., Inc.**<sup>3</sup>, 76-78 Varick St., New York, N. Y.

**New York Scientific Supply Co.**<sup>3</sup>, 28 West 30th St., New York, N. Y.

**Nu-Art Films, Inc.**, 112 West 48th St., New York 19, N. Y.  
16mm sound and silent and 8mm educational films (rental and sale)

Films of the Nations  
Ampro slide and motion picture projectors  
Victor Animatograph motion picture equipment

**Palo-Myers, Inc.**<sup>3</sup>, 81 Reade St., New York 7, N. Y.

**Para Laboratory Supply Co.**<sup>3</sup>, 221 North Hermitage Ave., Trenton 8, N. J.

**R. E. Park Co.**, Lincoln Bank Building, Syracuse 2, N. Y.

**Peckham, Little & Co.**, 243 West 17th St., New York, N. Y.

<sup>1</sup> Member National School Service Institute; <sup>2</sup> Member National Audio-Visual Association; <sup>3</sup> Laboratory Supply Distributor.

Roberts Brothers, Inc.<sup>1</sup>, Collingswood, N. J.

Scientific Glass Apparatus Co., Inc.<sup>3</sup>, 49 Ackerman St., Bloomfield, N. J.

Ray S. Snyder Company, 9 East 45th St., New York 17, N. Y.  
Fred Medart Products Gymnasium Apparatus, Scoreboards, Trampolines, Telescopic Gym Seats, Lockers, Lockerobes, etc.  
National Dryer Corp.—Electric Hand-hair dryers  
Folding Chairs and Folding Tables  
Wood and Steel Bleachers and Grandstands

Sonocraft Corporation, 115 W. 45th St., New York 19, N. Y.  
Recording and Sound Equipment  
Tape Disc Wire  
Projectors, screens, accessories

Standard Scientific Supply Corp.<sup>3</sup>, 34-38 West 4th St., New York, N. Y.

Sullivan Sound Service, 7 Caryl Avenue, Yonkers, N. Y.

Otto Ulbrich Co., Inc., 386 Main St., Buffalo, N. Y.

United Projector & Film Corp., 228 Franklin St., Buffalo 2, N. Y.

Webster Paper & Supply Co., Inc.<sup>1</sup>, Central Warehouse Bldg., Albany 4, N. Y.

American Crayon Co., "Old Faithful" art items  
Binney & Smith Co., "Gold Metal" art materials  
Complete line of school and art materials  
Playground items

Wilber Visual Service<sup>2</sup>, 28 Genessee St., New Berlin, N. Y.; 119 State St., Albany 7, N. Y.

Bell & Howell Special Representative  
Complete Audio-visual Sales and Service

Will Corporation<sup>3</sup>, 39 Russell St., Rochester 3, N. Y.; Branch: 596 Broadway, New York 12, N. Y.

Art Zeiller Visual Education Service, 350 Main St., East Orange, N. J.

### Region 3—Pennsylvania, Delaware, Maryland

Edward E. Babb & Co.<sup>1</sup>, 3304 Arch St., West Philadelphia, Pa.

Burrell Technical Supply Co.<sup>3</sup>, 1936—5th Ave., Pittsburgh 19, Pa.

E. J. Callahan & Co.<sup>3</sup>, 14 Barre St., Baltimore 1, Md.

Edward P. Dolbey & Company<sup>3</sup>, 3613 Woodland Ave., Philadelphia, Pa.

C. M. Eichenlaub Co.<sup>1</sup>, 813 Architects Bldg., Philadelphia 3, Pa.; 602 Empire Bldg., Pittsburgh 22, Pa.

Chapel furniture  
Peabody classroom and auditorium seating  
Sjostrom library and laboratory furniture  
Steel lockers and filing cabinets  
Wayne gymstands and grandstands

Fisher Scientific Co.<sup>3</sup>, 711 Forbes St., Pittsburgh, Pa.; Branch: 7722 Woodbury Drive, Silver Spring, Md.; 904 St. James St., Montreal, Canada

Garrett-Buchanan Co.<sup>1</sup>, 12 South 6th St., Philadelphia, Pa.

The Henry B. Gilpin Co.<sup>3</sup>, 302 W. Lombard St., Baltimore, Md.

Harshaw Scientific<sup>3</sup>, Division of Harshaw Chemical Company, 117 South 17th St., Philadelphia 3, Pa.

L. B. Herr & Son<sup>1</sup>, 46-48 West King St., Lancaster, Pa.

W. G. Hintz, Inc.<sup>1</sup>, 838 Penn St., Reading, Pa.

William G. Johnston Company<sup>1</sup>, 1130 Ridge Ave., Pittsburgh 12, Pa.

American Desk Mfg. Company  
Art and Handicraft materials  
Belton Seating Company  
Berger Steel furniture and lockers  
General school supplies  
Holmes sound projectors  
Kindergarten supplies and furniture  
Leonard Peterson laboratory, household art equipment  
J. E. Porter playground and gymnasium equipment  
Everwear playground equipment

Estate of Harry A. Keene<sup>1</sup>, Pottstown, Pa.  
General and Art School Supplies

Kemmerer Paper Co.<sup>1</sup>, 355 Hamilton St., Allentown, Pa.

Kunz Motion Picture Service<sup>2</sup>, 1319 Vine St., Philadelphia 7, Pa.; Branch Offices: 1905 Sanderson Ave., Scranton 9, Pa.; 426 N. Calvert St., Baltimore 2, Md.

Kurtz Bros.<sup>1, 2</sup>, Clearfield, Pa.; Branch: 8033 Bennett St., Pittsburgh 21, Pa.

Audio-Visual Equipment and Supplies  
Complete School Supply and Equipment Lines  
Kindergarten and Playground Apparatus  
Class, Plan Books and School Annual Publishers

J. P. Lilley & Son<sup>2</sup>, 277 Boas St., Harrisburg, Pa.

Distributor Victor sound projectors and cameras  
Illustravox and Operadio sound slidefilm projectors  
Newcomb sound & P A systems and record changers  
Brush soundmirrors (tape recorders)  
Spencer (American Optical) slide and filmstrip projectors  
SVE Golde & Viewlex slide and filmstrip projectors  
Radiant projection screens  
Sawyer Viewmasters and Viewmaster reels  
Castle, Official & Pictorial Films  
Coronet & Young American Films  
Popular Science filmstrips & recorders  
Operadio sound systems  
SVE slides and filmstrips  
Cathedral Church Craft & Church Screen films & strips  
Audio-visual equipment and film rental library  
Sound projector service and maintenance

Lippincott Pictures, Inc., 4729 Ludlow St., Philadelphia 39, Pa.

Roberts & Meck, Inc.<sup>1</sup>, 18th & Bellevue Sts., Harrisburg, Pa.

Audio-visual equipment  
Bavinco homemaking equipment  
Draper window shades  
Maintenance and sanitary supplies  
Master-Leaf Record Books  
School furniture  
School supplies and equipment  
Standard Duplicating machines

The Scientific Equipment Co.<sup>3</sup>, 3527 Lancaster Ave., Philadelphia 4, Pa.

N. Snellenburg & Co.<sup>1</sup>, 12th & Market Sts., Philadelphia, Pa.

Stark Films<sup>2</sup>, 537 N. Howard St., Baltimore 1, Md.

Arthur H. Thomas Co.<sup>3</sup>, West Washington Square, Philadelphia, Pa.

Harry A. Trumpfheller, 1411 East Cliveden St., Philadelphia 19, Pa.

Arlington Seating Co., school seating  
Folding chairs and tables  
Wood tablet arm chairs and student chairs

J. T. Vernay & Sons, 5 East Lexington St., Baltimore, Md.

Williams, Browne & Earle, Inc.<sup>3</sup>, 918 Chestnut St., Philadelphia, Pa.

<sup>1</sup> Member National School Service Institute; <sup>2</sup> Member National Audio-Visual Association; <sup>3</sup> Laboratory Supply Distributor.



## Region 4—Ohio, Michigan (Lower Peninsula), West Virginia

- Olson Anderson Co.**<sup>2</sup>, 1113 McKinley Ave., Bay City, Mich.
- Capital Film Service**<sup>2</sup>, 224 Abbott Road, East Lansing, Michigan  
Bell & Howell special representative  
Audio-visual equipment  
Film rentals  
Producers of industrial and educational slide films and motion pictures  
Sound recording studios
- Carpenter Visual Service, Inc.**<sup>2</sup>, 13902 Euclid Ave., Cleveland 12, Ohio  
Bell & Howell service
- Chemical Rubber Co.**<sup>2</sup>, 2310 Superior Ave., Cleveland, Ohio
- Consolidated Supply Co.**, 414 Centab Drive, Columbus 3, Ohio  
Acme folding chairs  
American playground equipment  
Richard Best Pencils  
Binney-Smith art materials  
Dettra Flags & Banners  
Ideal kindergarten & primary materials  
Indiana desks and chairs  
Rowles Chalkboards and bulletin boards  
Kowles window shades
- Crichton Engineering Co.**<sup>1</sup>, P.O. Box 1946, Suite 203-06  
Payne Bldg., Charleston 27, W. Va.
- The Dobson-Evans Company**<sup>1</sup>, 1100 W. Third Avenue, Columbus 8, Ohio  
American Crayon art supplies  
American Seating furniture  
DeVry audio-visual aids  
Ditto machine supplies and paper  
Draper light and darkening shades  
Everwear playground equipment  
Kewaunee laboratory equipment  
Leavitt bleachers and stadiums  
Art papers  
School papers, note book fillers and tablets  
School register class record plan books
- Eberbach & Son Co.**<sup>2</sup>, 200 East Liberty St., Ann Arbor, Michigan  
Laboratory equipment, apparatus and supplies
- The Educational Supply Co.**, 26 S. State, Painesville, Ohio
- Engleman Visual Education Service**<sup>2</sup>, 4754-56 Woodward Ave., Detroit 1, Michigan
- Escar Motion Picture Service, Inc.**<sup>2</sup>, 7315 Carnegie Ave., Cleveland 3, Ohio
- B. F. Farnell Co.**<sup>1</sup>, 435 W. 7 Mile Road, Detroit 3, Michigan  
School, laboratory furniture  
Window shades, chalk and bulletin boards
- Film Associates**, 440 East Schantz Ave., Dayton 9, Ohio
- Fryan Film Service**, 3228 Euclid, Cleveland 15, Ohio
- Ralph V. Haile & Associates**<sup>2</sup>, 215 Walnut St., Cincinnati, Ohio
- J. G. Haley**<sup>2</sup>, P.O. Box 703, Charleston 23, W. Va.
- Harshaw Scientific**<sup>3</sup>, Div. of Harshaw Chemical Company, 1945 E. 97th St., Cleveland 6, Ohio; Branches: 224-26 Main St., Cincinnati 2, Ohio; 9240 Hubbell Ave., Detroit 27, Mich.
- W. F. Hausman Co.**, Acme School Supply Division, 2nd & Race Sts., Cincinnati 2, Ohio
- G. E. Henry Company**, 263 East Long Street, Columbus 15, Ohio
- J. R. Holcomb & Co.**<sup>1</sup>, 1710 E. 22nd St., Cleveland 14, Ohio
- Howard & Smith, Inc.**, 14255 Schaefer, Detroit 27, Michigan
- Ideal Seating Company**, Grand Rapids, Michigan  
Stadium type seating for Drive-in-Theatres  
Stadiums and arenas  
Auditorium seating for Theatres, Schools and Churches
- The James & Law Company**<sup>1</sup>, 217 W. Main St., Clarksburg, W. Va.
- The Kauffman-Lattimer Company**<sup>2</sup>, Front and Chestnut Sts., Columbus 16, Ohio
- Frank W. Kerr Co.**<sup>3</sup>, 951 Porter St., Detroit, Mich.
- Theodore Kundtz Co.**<sup>1</sup>, 1275 Main St., Cleveland, Ohio
- Kyle & Co.**<sup>1, 2</sup>, Court St. & Washington Ave., Clarksburg, W. Va.
- M. E. Lockard Co.**, 1025 N. Main St., Akron, Ohio
- McFadden Corp.**, 619 E. Hazel, Lansing 1, Mich.
- The McManus-Troup Co.**, 713-715 Jefferson Ave., Toledo, Ohio
- M. H. Martin Co.**<sup>2</sup>, 50 Charles Ave. S. E., Massillon, Ohio  
Bell & Howell special representatives  
Operadio Manufacturing Co., sound systems  
Spencer and Beseler opaque projectors  
Audio-visual equipment and supplies
- Michigan Products, Inc.**<sup>1</sup>, 1236 Turner St., Lansing, Mich.
- Michigan School Service, Inc.**<sup>1</sup>, Main Box 509, Lansing, Michigan
- Miller Office Supply Co.**, 111 W. High St., Piqua, Ohio  
Arlington Seating furniture  
Norcor seating furniture  
Lyon lockers and folding chairs  
Walrus laboratory equipment  
Rice window shades  
Litesite chalkboards  
Cram maps and globes  
Natco 16mm sound projectors
- Orr, Brown & Price Co.**<sup>3</sup>, Spring & Fronts Sts., Columbus, Ohio
- B. Preiser Co., Inc.**<sup>3</sup>, 416 West Washington St., Charleston, W. Va.
- Projection Aids Corp.**, 1408 Schofield Bldg., Cleveland, Ohio
- Pavis, Inc.**, 427 West Washington St., Charleston 2, W. Va.  
R. C. A. and Natco projectors  
R. C. A. Sound Products  
Coronet Films, Inc., and Young America Films  
S.V.E. GoldE and Viewlex Projectors  
Sound projection service and repairs
- Rupp & Bowman Co.**<sup>3</sup>, 319 Superior St., Toledo 3, Ohio
- E. H. Sargent & Co.**<sup>3</sup>, Michigan Division, 1959 E. Jefferson, Detroit 7, Michigan
- Sunray Films, Inc.**<sup>2</sup>, Payne Ave., Cleveland 14, Ohio  
Complete selection of audio-visual educational equipment and 16mm. sound film library
- Theatre Service & Supply Company**, Box 1389, Huntington, W. Va.  
Films—Projectors—Stage Equipment—Spotlights
- Twyman Films, Inc.**<sup>2</sup>, 29 Central Ave., Dayton 1, Ohio
- Harry M. Ward Company**<sup>1</sup>, 222 N. Walnut St., Bryan, Ohio
- The Max Woche & Son Co.**<sup>3</sup>, 609 College St., Cincinnati 2, Ohio

<sup>1</sup> Member National School Service Institute; <sup>2</sup> Member National Audio-Visual Association; <sup>3</sup> Laboratory Supply Distributor.

## Region 5—Virginia, N. & S. Carolina, Georgia, Florida, District of Columbia, Puerto Rico, Tennessee, Mississippi, Alabama

- Alabama School Supply Co.**<sup>1, 2</sup>, 945 N. McDonough St., Montgomery 1, Alabama
- A. S. Aloe Company**, 1501-14th St., North West, Washington, D. C.
- American Seating Co.**<sup>1, 2</sup>, 354 Nelson St., S. W., Atlanta 3, Georgia
- Athens Equipment Co.**, P.O. Box 332, Athens, Tenn.
- Bishop Office Equipment, Inc.**<sup>1</sup>, 37-79 E. Robinson Ave., Orlando, Florida
- Bowen Supply Co.**, 125 E. Reynolds St., Plant City, Fla.
- Paul L. Brand & Son**, 2153 K Street, N.W., Washington 7, D. C.  
Film Rentals & Sales for the Educator  
Projection Service for Conventions and Public Relations Meetings  
Distributor of Visual Education Equipment  
Special Representative For Bell & Howell projectors and cameras, authorized Service Stations, all parts carried in stock  
Coronet Instructional Films  
Da-Lite Screens  
Draper darkening shades  
Films, Inc., recreational films  
British Information Service public forum films  
Films from New Zealand
- Calhoun Company**<sup>2</sup>, 235 Ponce De Leon Ave., N.E., Atlanta, Georgia
- Walker C. Cottrell, Jr.**, 408 East Main St., Richmond 19, Va.  
Projection and sound equipment
- The Distributor's Group, Inc.**, 756 West Peachtree St., N.W., Atlanta, Georgia
- H. & W. B. Drew Co.**, P.O. Box 270, Jacksonville 1, Florida
- Estes Surgical Supply Co.**<sup>3</sup>, 56 Auburn Ave., N.E., Atlanta, Georgia  
Pyrex and Kimble glassware  
Spencer microscopes  
Analytical balances  
Chemicals  
General laboratory supplies
- Jasper Ewing & Sons**<sup>2</sup>, 227 South State St., Jackson, Mississippi  
Audio-visual teaching equipment  
Bell & Howell Special Representative
- Flowers School Equipment Co.**<sup>1, 2</sup>, P.O. Box 1197, Richmond, Va.
- Forbes Piano Co.**, Birmingham 3, Ala.
- Gray & Creech, Inc.**, Winston-Salem, Charlotte and Raleigh, N. C.  
A. B. Dick mimeograph products  
Elliott addressing machines
- James A. Head & Co.**, 2015 First Ave. N., Birmingham, Ala.
- Highland Products Co.**, 720 Gay St., Knoxville, Tenn.
- Ideal Pictures**<sup>2</sup>, 219 E. Main St., Richmond, Va.
- Jones School Supply Co.**, Columbia, S. C.
- L. D. Lawrence Co., Inc.**<sup>1</sup>, 824 Abella Rd., Columbia, S. C.
- Martin School Supply Co.**, Box 441, San Juan, Puerto Rico  
Beckley Cardy Co., blackboards and erasers
- The McGregor Company**<sup>1</sup>, 321 E. Clayton St., Athens, Georgia
- McKesson & Robbins, Inc.**<sup>3</sup>, Laboratory Supply Department, 1706 First Ave., Birmingham 3, Alabama  
Pyrex and Kimble glassware  
Spencer and Bausch & Lomb microscopes  
Analytical balances  
Chemicals and biologicals  
General laboratory supplies
- Milton Bradley Co.**, Springfield, Mass.
- Mississippi School Supply Co.**<sup>1, 2</sup>, 116 East South St., Jackson, Mississippi
- John R. Moffit Co., Inc.**<sup>1, 2</sup>, 108 N. McDonough St., Montgomery, Alabama  
Audio-visual equipment and supplies  
School and church seating
- Wilfred Naylor**<sup>2</sup>, 1907 Fifth Ave. N., Birmingham 1, Alabama
- Nashville Products Co.**<sup>1</sup>, 158 Second Ave., Nashville, Tenn.
- Newton School Equipment Co.**<sup>1</sup>, P.O. Box 4334, Jacksonville, Florida
- Norman Laboratories & Studio**, Arlington Suburb, Jacksonville, Fla.
- Nu-Idea School Supply Co.**<sup>1</sup>, 127 Harvin St., Sumter, S. C.
- F. A. Owen Publishing Co.**, Dansville, New York
- John H. Pence**<sup>1</sup>, P.O. Box 863, Roanoke 5, Virginia
- Phipps & Bird, Inc.**<sup>3</sup>, P.O. Box 2V, Richmond, Va.
- The Powers Co.**, 106-108 St. Michael St., Mobile 1, Ala.
- School & Office Supply Co.**, 407 W. Clinch Ave., Knoxville, Tenn.
- Sheridan School Supply Co.**, Greenwood, S. C.
- Herschel Smith Co.**<sup>2</sup>, 119 Roach St., Jackson 110, Mississippi
- Southeastern Equipment Co., Inc.**, Siler City, N. C.
- Southern Desk Co.**, Drawer 630, Hickory, N. C.
- Southern Scientific Company**<sup>3</sup>, 188-192 Walton St. N.W., Atlanta, Georgia
- Southern Visual Films**<sup>2</sup>, 687 Shrine Bldg., Memphis, Tennessee
- Standard School Service**, 3827 1st Ave., North Birmingham 6, Alabama
- Strickland Film Co.**, 141 Walton St., N. W. Atlanta, Ga.
- Taylor Paper Co.**<sup>1</sup>, 420 S. Front St., Memphis, Tennessee
- Technical Products Co.**, 158 Madison Ave., Memphis, Tenn.
- Tennessee Equipment & Supply Co.**, 116 2nd Ave., North, Nashville, Tennessee  
Medart Products, Inc., Gymnasium Equipment  
Leonard Peterson & Co., Science, Home Economics & Library  
Peabody Seating Co., General Classroom seating  
Victor Animatograph, All Types audio visual equipment  
Beckley Cardy Co., Published materials  
Schieber Mfg. Co., In-wall Folding Tables  
In addition to above, all types of school and church equipment as well as consultant service on functional planning.
- Universal School Equipment Co.**, 3709 Hillsboro St., Raleigh, N. C.
- Virginia School Equipment Co., Inc.**<sup>1</sup>, 111 E. Main St., Richmond 19, Va.

<sup>1</sup> Member National School Service Institute; <sup>2</sup> Member National Audio-Visual Association; <sup>3</sup> Laboratory Supply Distributor.

## Region 6—Indiana, Illinois, Kentucky

- All-Star Pictures**, 39 West Adams St., Chicago, Illinois  
Entertainment, Educational, Supplementary—Educational films (16mm sound)  
Ampro and Victor Projection Equipment
- Association Films**<sup>2</sup>, 206 South Michigan Ave., Chicago 3, Illinois
- Everett M. Bailey**, 306 Indiana Ave., Pontiac, Ill.
- Thomas Baird & Son**<sup>1</sup>, 245 N. Dearborn Ave., Kankakee, Ill.
- Beckley-Cardy Co.**<sup>1</sup>, 1682 Indiana Ave., Chicago 16, Illinois
- A. M. Blood Co.**<sup>1</sup>, 326-20th St., Rock Island, Illinois
- I. A. Bock School Service**, Sycamore, Ill.
- Milton Bradley Co.**<sup>1</sup>, 811 S. Wabash Ave., Chicago, Ill.
- Brady & Earnhart**<sup>1</sup>, 215 West 3rd St., Marion, Ind.
- Burke's Motion Picture Co.**<sup>2</sup>, 434 Lincoln Way West, South Bend 5, Indiana
- Carpenter School Equipment Company**<sup>1</sup>, Mitchell, Indiana
- Central School Supply Co., Inc.**<sup>1</sup>, 311 W. Main St., Louisville, Kentucky
- Central Scientific Co.**<sup>3</sup>, 1700 Irving Park Road, Chicago 13, Illinois  
Laboratory equipment, apparatus and supplies for physics, chemistry, biology and general science
- Chicago Apparatus Co.**, 1735 N. Ashland Ave., Chicago, Ill.
- A. Daigger & Co.**, 159 W. Kinzie St., Chicago 10, Ill.
- D. T. Davis Co.**<sup>2</sup>, 178 Walnut St., Lexington 34, Ky.; 528 South 5th St., Louisville 2, Ky.
- A. Flanagan Co.**, 730 North Franklin, Chicago, Ill.
- Fletchers Visual Supplies**, 218 W. Main St., Urbana, Ill.
- Garden City Educational Co.**, 27 S. Wabash Ave., Chicago, Ill.
- The D. H. Goble Printing Company**<sup>1</sup>, 15 S. East St., Greenfield, Indiana  
Indiana Distributors for Rice Hold-Fast Shades
- Hoosier Supplies**<sup>1</sup>, 427 Main St., Vincennes, Indiana
- Illinois School Supply Co.**, 114-120 South 7th St., Quincy, Illinois  
American Crayon art materials  
Arlington School Seating Equipment  
Draper Window and Darkening Shades  
Kenworthy Educational Materials
- Indiana Visual Aids Co., Inc.**, 726 N. Illinois St., Indianapolis 6, Indiana
- Kentucky School Equipment Co.**, 117 S. 4th Ave., Louisville, Ky.
- Kiger & Co., Inc.**<sup>1</sup>, 52-58 W. New York St., Indianapolis 4, Indiana  
American Art Clay Co., clays, chalks  
American Seating Co., furniture  
Draper shades
- Hamilton laboratory furniture  
S. C. Johnson & Co., waxes  
Mitchell Mfg. Co., folding tables  
Shaw-Walker files and supplies
- Arthur S. La Pine & Co.**<sup>3</sup>, 121 W. Hubbard St., Chicago, Illinois  
Laboratory supplies and equipment  
Reagent chemicals
- Lee School Supply Co.**, 21 South 4th St., Terre Haute, Ind.
- Leonard Supply Co.**, Silver Lake, Ind.
- Mapes Brothers**, Ogden, Ill.
- McHenry Films, Inc.**, 608 Dearborn St., Chicago 5, Ill.
- The Miller School and Office Supply Co.**<sup>1</sup>, 5031 Hohman Ave., Hammond, Indiana  
Peabody Seating Co.  
Weber-Costello chalkboard and cork  
Draper shades  
Copy-rite liquid duplicators
- Modern School Supply Division of Allied, Inc.**<sup>1</sup>, 3810 E. 16th St., Indianapolis 7, Indiana  
Cram maps and globes  
Ditto duplicators and supplies  
Jam Handy slide films and motion picture films  
Peabody seating  
RCA projectors  
Wayne school bus bodies  
Complete school supplies and equipment  
Playground equipment  
Sanitary and maintenance supplies
- Potomac Engineering Corp.**, 664 N. Michigan Ave., Chicago, Ill.
- Rascher & Betzold, Inc.**, 730 Franklin St., Chicago, Ill.
- C. H. Rousch & Co.**, Madison, Ind.
- E. H. Sargent & Co.**<sup>3</sup>, 155 E. Superior St., Chicago, Illinois
- Shick Supply & Equipment Co.**, 726 McReynolds Ave., Danville, Ill.
- Sunny Schick's**, 407 W. Washington Blvd., Ft. Wayne, Indiana
- Scientific Supply Co.**<sup>3</sup>, 1867 West Ogden Ave., Chicago 12, Illinois  
Merck, Mallinckrodt, Precision  
Coleman & Bell, American Optical  
Welch Allyn, Whatman, S&S  
B-D, Kimble, Pyrex, Clay Adams
- Standard Science Supply Co.**<sup>3</sup>, 1232-34 N. Paulina St., Chicago, Illinois
- O. J. Steffy & Son**, Carlisle, Ind.
- Stinson Projector Sales**<sup>2</sup>, 521 S. Lombard Ave., Oak Park, Illinois
- Tri-State School Supply Co.**, 810 Main St., Evansville 8, Indiana
- Wilkens Anderson Co.**, 4525 Sedgwick St., Chicago, Ill.

## Region 7—N. &amp; S. Dakota, Iowa, Minnesota, Wisconsin, Upper Michigan, Manitoba, Canada

- A. S. Aloe Co.**<sup>3</sup>, 610 Third Avenue South, Minneapolis 2, Minnesota
- Brook School Supply**<sup>1</sup>, 5810 Seventh Ave., Kenosha, Wisconsin
- Cinarco Visual Service Co.**, 312 Main St., Davenport, Iowa  
Bell & Howell special representative  
Bell & Howell authorized service station  
Bausch & Lomb opaque projectors

<sup>1</sup> Member National School Service Institute; <sup>2</sup> Member National Audio-Visual Association; <sup>3</sup> Laboratory Supply Distributor.



**Cinarco Visual Service Co.—(continued)**

Du Kane Tape Recorder  
Webster Ekotape recorder

**Colborn School Supply Co.<sup>1</sup>, Grand Forks, N. D.****Coleman School Supply Company<sup>1</sup>, Coleman, Wisconsin**  
We carry in stock equipment and all general school supplies**Eau Claire, Book & Stationery Co.<sup>1, 2</sup>, Eau Claire, Wisconsin**

American Crayon Co.  
American Seating Co.  
Berger steel lockers  
Ditto, Inc., duplicators and supplies  
Luther O. Draper window shades  
Jam Handy slidefilms and motion picture films  
Leavitt knockdown and telescoping bleachers  
R. C. A. sound-on film projectors  
Tell City schoolchairs  
Complete school supplies and equipment

**J. W. Ederly & Company, Ottumwa, Iowa****Educator Supply Co.<sup>1</sup>, 309 N. Lawlor St., Mitchell, S. D.**  
Complete supply and equipment service for schools since 1890**Farnham Stationery & School Supply Co., 301 S. 5th St., Minneapolis, Minn.****Fond du Lac School Supply Co.<sup>1</sup>, 36 S. Main St., Fond du Lac, Wisconsin**

J. E. Burke playground equipment  
Du Pont Tontine window shades  
A. J. Nystrom maps  
Peabody Seating Co.  
Royale school papers  
Wolber duplicators  
School supplies and equipment

**Gallagher Films<sup>2</sup>, 113 St. Washington St., Green Bay, Wisconsin; Branch: 639 N. 7th St., Milwaukee 3, Wisconsin****Gateway Paper & Supply Co.<sup>1</sup>, 156-160 St. Lawrence Ave., Beloit, Wisconsin****Holley School Supply Co.<sup>1</sup>, 100 E. Grand Ave., Des Moines 7, Iowa****Hub City School Supply Co., 2nd Ave., Aberdeen, S. D.****Hunt's Supply Co., Wautoma, Wis.****J. S. Latta & Son<sup>1</sup>, 909 W. 23rd St., Cedar Falls, Iowa**

Bavineco Homemaking Equipment  
Kewannee Laboratory Furniture  
Complete school supply and equipment line  
Peabody classroom and auditorium seating  
American Crayon Co.  
Jam Handy slidefilms and curriculum Slide films  
E. W. A. Rowles chalkboards, shades, erasers, corkboard  
S.V.E. projectors and slidefilms  
Royale school papers  
Universal Bleachers knockdown or roll-away  
Howell Playground equipment

**Metropolitan Supply Co.<sup>1</sup>, 602-616 Third St., S.E., Cedar Rapids, Iowa****Midwest Audio-Visual Co., 1504 Hennepin Ave., Minneapolis, Minn.****Midwest-Beach Co.<sup>1</sup>, 222 S. Phillips Ave., Sioux Falls, S. D.****National Camera Exchange, 86 S. 6th St., Minneapolis, Minn.****Northern School Supply Co.<sup>1, 2</sup>, N.P. & 8th St., Fargo N. D.****Northwest Products Co., 127 W. 10th St., Sioux Falls, S. D.****Photoart House<sup>2</sup>, 844 N. Plankinton Avenue, Milwaukee, Wisconsin****Roemer Drug Co., 806 North Broadway, Milwaukee, Wisconsin****Ryan Visual Aids Service, 409 Harrison St., Davenport, Iowa****St. Paul Book & Stationery Co., 55 East Sixth St., St. Paul, Minn.****Twin City School Supply Co., Neenah, Wisconsin****United Chemical Co., 2115 Como Ave., S. E., Minneapolis, Minn.****Upper Peninsula Office Supply Co.<sup>1</sup>, Guelff Bldg., Marquette, Michigan****George T. Walker & Co., 324—5th Ave., S., Minneapolis, Minn.****Region 8—Missouri, Kansas, Nebraska****A. S. Aloe Company<sup>3</sup>, 1819 Olive St., St. Louis 3, Missouri**  
Branch: Bryant Bldg., 11th & Grand Aves., Kansas City**Blackwell-Wielandy Co., 1601 Locust St., St. Louis, Mo.****Bowlus School Supply Co.<sup>1</sup>, 1015 N. Broadway, Pittsburg, Kansas****Buxton & Skinner Printing & Stationery Co.<sup>1</sup>, 306 N. 4th St., St. Louis 2, Missouri****The Edwards Press<sup>1</sup>, Osceola, Missouri****Erker Bros. Optical Co., 610 Olive St., St. Louis, Mo.****Fisher Scientific<sup>3</sup>, 2109 Locust St., St. Louis 3, Missouri****Goldsmith Book & Stationery Co., Wichita 1, Kansas****A. J. Griner Co.<sup>3</sup>, 1827 McGee St., Kansas City 8, Missouri****B. R. Harris & Company<sup>1</sup>, 722 Washington St., Chillicothe, Missouri****Heil Corporation, 210 S. 4th St., St. Louis, Mo.****Hoover Brothers, Inc., 922 Oak St., Kansas City, Mo.****Kansas City Laboratory Supply Company<sup>3</sup>, 1434 Wyandotte St., Kansas City 6, Missouri****Kansas City Sound Service Co., 1402 Locust St., Kansas City, Mo.****J. G. Kretschmer Company, 315 South 17th St., Omaha 2, Nebraska, 316 Royal Union Bldg., Des Moines, Iowa**

Bell & Howell Filmosounds and Cameras  
American Optical and Spencer Lens Products  
Coronet Instructional Films  
Vocational Guidance Films  
S. V. E. Equipment and Materials

**The Ed McClure Company<sup>1</sup>, 601 Walnut St., Kansas City 6, Missouri**

American Desk Mfg Co., auditorium and classroom seating  
Lockers, wardrobes, filing equipment  
Folding chairs and office furniture

**Millard-Heath Company<sup>3</sup>, 325 Olive Street, St. Louis, Missouri****The Missouri Store Co., 909 Lowry St., Columbia, Mo.****Omaha School Supply Co., 1113 Nicholas St., Omaha, Nebraska****Quivira Specialties Company<sup>3</sup>, 4010 W. 21st Street, Topeka 19, Kansas**

Biological supplies and natural history books  
Live and preserved specimens, slides, insect pins

**School and Park Supply Co., Inc., 1650 S. Broadway, Wichita 11, Kansas**

<sup>1</sup> Member National School Service Institute; <sup>2</sup> Member National Audio-Visual Association; <sup>3</sup> Laboratory Supply Distributor.

**Southwest Scientific Corp.**<sup>3</sup>, 122 South St. Francis Street,  
Wichita, Kansas  
Laboratory Supplies

**Stephenson School Supply Co.**, 935 O St., Lincoln, Nebraska

**Swank Motion Pictures**, 620 Skinker Blvd., St. Louis, Mo.

**The University Publishing Company**<sup>1, 2</sup>, Superior School  
Supply Co., 1126 Q Street, Lincoln 1, Nebraska

Branch: 1917 Main, Kansas City, Missouri  
American Crayon art supplies  
Bavinco homemaking equipment  
DeVry sound projectors  
Ditto duplicating machines and supplies  
Heywood-Wakefield school and auditorium seating  
Jam Handy slide films  
Porter playground and gym equipment  
Wayne gym stands and bleachers  
Complete supply and equipment lines

### Region 9—Washington, Oregon, Idaho, Montana, Alberta, Canada, Alaska

**James C. Bangs Stationers, Inc.**, 137 N. Main Street, Pocatello, Idaho

**The Caxton Printers, Ltd.**, 312 Main St., Caldwell, Idaho

**Chugach Air Theatres**<sup>2</sup>, Box 324, Anchorage, Alaska  
Bell & Howell special representative  
Encyclopaedia Britannica Films

**Colborn School Supply Co.**, 2701 Minn. Ave., Billings, Montana

**C. M. Fassett Co.**<sup>3</sup>, W. 9 Trent Ave., Spokane 8, Washington  
Laboratory and school furniture

**J. K. Gill & Company**<sup>1</sup>, 408 Fifth Ave., S. W., Portland, Oregon

**John W. Graham Co.**, 708 Sprague Ave., Spokane, Washington

**Inland Audio-Visual Company**, West 16 Sprague Ave., Spokane 8, Washington  
Audio-visual equipment and supplies

**Johnson's, Inc.**, 23 South Mission St., Wenatchee, Wash.  
Central Washington's Audio-Visual Dealer

**Lowman & Hanford Co.**, 1515 - 2nd Ave., Seattle, Washington

**Moore's Motion Picture Service**<sup>2</sup>, 306-10 S. W. 9th Ave., Portland, Oregon

Special Representative—Bell & Howell Company

**Northern School Supply Company**<sup>1, 2</sup>, 1505 Lovejoy St., N. W., Portland 9, Oregon; Branches: 2603 First Ave., Seattle, Wash.; S. 124 Wall St., Spokane, Wash.

American Crayon Company  
American Seating Company, school furniture  
Armstrong Cork bulletin boards  
Ditto duplicators and supplies  
Draper shades  
Medart gymnasium seating and equipment  
E. H. Sheldon & Co., laboratory and homemaking equipment  
Stagecraft draperies, hardware and lighting  
Victor cameras and projectors  
Weber Costello Company Hyloplate and Sterling and Lite-Site

**F. E. Osborne Limited**<sup>1</sup>, 112 8th Ave., West Calgary, Alberta, Canada

**Rosser & Sutton**<sup>1</sup>, 211 W. Yakima Ave., Yakima, Washington

**Scientific Supplies Co.**, 123 Jackson St., Seattle, Washington

**Washington School Supply Co.**, 511 Westlake Ave., Seattle, Washington

### Region 10—California, Arizona, Nevada, New Mexico

**Allen School Supply Co.**, 58 S. MacDonald St., Mesa, Arizona

**A. S. Aloe Company**<sup>3</sup>, 1150 South Flower St., Los Angeles 15, California

**American Seating Company**<sup>1, 2</sup>, 6900 Avalon Blvd., Los Angeles, California

**Armanko Office Supply Company**, 152 N. Virginia St., Reno, Nevada

**Association Films**<sup>2</sup>, 351 Turk St., San Francisco, California

**Austin Bentley Seating Company**, 1501 S. La Brea St., Los Angeles, California

**The Braun Corporation**<sup>3</sup>, 2260 East 15th St., Los Angeles, California

**Braun-Knecht-Heimann Co.**, 1400—16th St., San Francisco, Calif.

**A. Carlisle & Co.**, 131 N. Virginia St., Reno, Nevada

**Central Scientific Company of California**, 16 Beale St., San Francisco, California

**H. S. Crocker Co., Inc.**, Box 353, San Francisco, California

**Donald J. Clausonthue**<sup>2</sup>, 1829 North Craig Ave., Altadena, California

**Adolph Frese Corp.**, 116 W. 17th St., Los Angeles, California

**Harshaw Scientific**<sup>3</sup>, Division of Harshaw Chemical, 609 S. Grand Ave., Los Angeles 14, California

**Hirsch & Kaye**, 239 Grant Ave., San Francisco, California

**Hockwald Chemical Company**, 135 Mississippi St., San Francisco 10, California

Janitors Supplies—non-slip wax  
Floor Finishes

**Kelton Audio Equipment Company**, 808 North First St., Phoenix, Arizona

**Marston Supply Company**<sup>1</sup>, 324 N. Central Ave., P. O. Box 1390, Phoenix, Arizona

**Morris Brothers**, 15 N. Hunter St., Stockton, California

**Motion Picture Enterprises**, 655 Kapiolani Blvd., Honolulu, Hawaii

**New Mexico School Supply Company**<sup>1, 2</sup>, 414 W. Copper Ave., Albuquerque, New Mexico

<sup>1</sup> Member National School Service Institute; <sup>2</sup> Member National Audio-Visual Association; <sup>3</sup> Laboratory Supply Distributor.

**PBSW Supply & Equipment Company**<sup>1, 2, 3</sup>, Box 551, 530 West Washington St., Phoenix, Arizona

**Pacific Laboratory Division of Central Scientific Co. of California**, 3555 Whittier Boulevard, Los Angeles 23, California

**Pacific Western Equipment Corp.**, 525 Santa Cruz Ave., Menlo Park, Calif.

**Carroll W. Rice Company**<sup>2</sup>, Audio-Visual Center, 424 40th St., Oakland 9, California

**School & Sports Supply Company**<sup>1</sup>, 220 North 7th Ave., Phoenix, Arizona

**Science Supplies**, James Campbell Bldg., Honolulu, Hawaii

**Stationers Corp.**, 525 S. Spring St., Los Angeles, Calif.

**University Apparatus Company**<sup>3</sup>, 2229 McGee Ave., Berkeley, California

**Valley Office & School Equip. Co.**, 1426 P. St., Bakersfield, Calif.

**J. Wentworth Co.**, Box 577, Albuquerque, New Mexico

**Zellerbach Paper Co.**, 534 Battery St., San Francisco, Calif.

## Region 11—Texas, Arkansas, Louisiana, Oklahoma

**All State Supply Corp.**<sup>1, 2</sup>, 1401 West Capitol Ave., Little Rock, Arkansas

**A. S. Aloe Company**<sup>3</sup>, 1425 Tulane Ave., New Orleans 13, Louisiana

**American Desk Manufacturing Company**<sup>1</sup>, P. O. Box 416, Temple, Texas  
School supplies and equipment

**American Seating Company**<sup>1, 2</sup>, 2930 Canton St., Dallas, Texas

**Arkansas Visual Education Service**, Conway, Arkansas

**Association Films**<sup>2</sup>, 1915 Live Oak St., Dallas, Texas

**Audio-Video, Inc.**<sup>2</sup>, 4000 Ross Ave., Dallas 4, Texas

**Bickley Brothers**<sup>1</sup>, 2017 Preston, Houston 2, Texas

**Boren-Malone Company**<sup>1</sup>, 211 S. Wewoka Ave., Wewoka, Oklahoma

Athletic goods and sportswear

School supplies and equipment

**W. H. Curtin & Company**<sup>3</sup>, P. O. Box 118, Houston 1, Texas  
Branch: 2800 Frenchmen St., New Orleans, La.

Laboratory apparatus and chemicals

**Democrat Printing & Lithographing Company**<sup>1, 2</sup>, 114 E. 2nd St., Little Rock, Arkansas

**Denver Fire Clay Company**, Mills Bldg., El Paso, Texas

**Dowlings**, 2nd & Broadway, Oklahoma City, Okla.

**Downs School Supply & Equipment Company**, 216 E. 7th St., Tulsa 3, Oklahoma  
School supplies and equipment

**Clarence J. DuBos & Sons**, 1101 Charles St., New Orleans, La.

**Jasper Ewing & Sons**<sup>2</sup>, 725 Poydras St., New Orleans, Louisiana

Bell & Howell Co., projectors and cameras

American Optical Company, projection equipment

Society for Visual Education, Filmstrips, Slides, Projectors

Squibb-Taylor Company, opaque projectors

**Fannen at Lamar**, Houston, Texas

Athletic Equipment

Physical Education Equipment

Sporting Goods

**Greene Brothers, Inc.**<sup>3</sup>, 1812 Griffin St., Dallas, Texas

**Griggs Equipment Co.**<sup>1</sup>, Box 630, Belton, Texas

Auditorium seating

Kindergarten chairs

Library tables

Movable chair desks

Stadium chairs

Tablet arm chairs

Unit tables and chairs

Window shades

**Gulf State Equipment Company**<sup>1</sup>, 1305 South Akard St., Dallas, Texas

Heywood-Wakefield Company, school seating and auditorium chairs

Clarín Manufacturing Company, folding chairs

Midwest Folding Products, folding tables

**F. F. Hansell Brothers, Limited**<sup>1</sup>, 131 Carondelet St., New Orleans 12, Louisiana

American Seating Company

Kewaunee Manufacturing Co.

Complete line school supplies

**Harshaw Scientific**<sup>3</sup>, Division of Harshaw Chemical Company, 6622 Supply Row, Houston 11, Texas

**Hertner's Camera Store**, 114 West 6th Ave., Amarillo, Texas

**W. C. Hixson Co.**, 712½ Elm St., Dallas, Texas

**Ideal Southern Pictures Co.**, 3218 Tulane Ave., New Orleans, La.

**Murray-Baker-Frederic, Inc.**, New Orleans, La.

**Oklahoma Seating Company**<sup>1</sup>, 19½ West Main St., Oklahoma City, Oklahoma

**Oklahoma School & Office Supply Co.**, 220 N. 3rd St., Muskogee, Okla.

**H. C. Parker, Inc.**, 336 Camp St., New Orleans 12, Louisiana

**Parkin Printing & Stationery Co.**, Little Rock, Ark.

**Practical Drawing Company**<sup>1</sup>, 2205 S. Lamar St., Dallas, Texas

**Refinery Supply Co.**, 621 E. 4th St., Tulsa, Okla.

**Rowley Company, Inc.**, 619 Baronne St., New Orleans, La.

**E. H. Sargent & Company**, Southwestern Division, 5915 Peeler St., Dallas, Texas

**W. G. Smith Company**<sup>1</sup>, 100 West 12th St., Houston 8, Texas

Leonard Peterson, laboratory furniture

Home economics furniture

Library furniture

Auditorium seating

Window shades

Slate and composition chalkboards

**Southern Seating Company**, 614 Gravier St., New Orleans, La.

**Southwest Soundfilms, Inc.**, 423 South St. Paul St., Dallas 1, Texas

**Standard Office Supply Co.**, 125 St. John St., Monroe, La.

**Thompson Book & Supply Company**<sup>1</sup>, 926 E. Main St., Ada, Oklahoma

E. H. Sheldon, laboratory furniture

American Desk Manufacturing Co.

**Nevil C. Withrow Co., Inc.**, 821 Pyramid Bldgs., Little Rock, Ark.

<sup>1</sup> Member National School Service Institute; <sup>2</sup> Member National Audio-Visual Association; <sup>3</sup> Laboratory Supply Distributor.



## Region 12—Colorado, Utah, Wyoming

**American School Supply Co.**, 1514 Arapahoe, Denver, Colo.

**Bailey School Supply**, Casper, Wyoming

**Centennial School Supply Co.**, Box 5224 Terminal Annex,  
Denver, Colo.

**Dale Deane's Home Movie Sales Agency**, 28 E. Ninth  
Ave., Denver, Colo.

**Denver Fire Clay Company**, 2301 Blake St., Denver 17,  
Colo.

**Deseret Book Company**, 44 East South Temple, P. O. Box  
958, Salt Lake City 10, Utah

Books, audio and visual equipment

Large entertainment and educational film rental library

Encyclopaedia Britannica classroom films

Audio-visual equipment maintenance and repair service

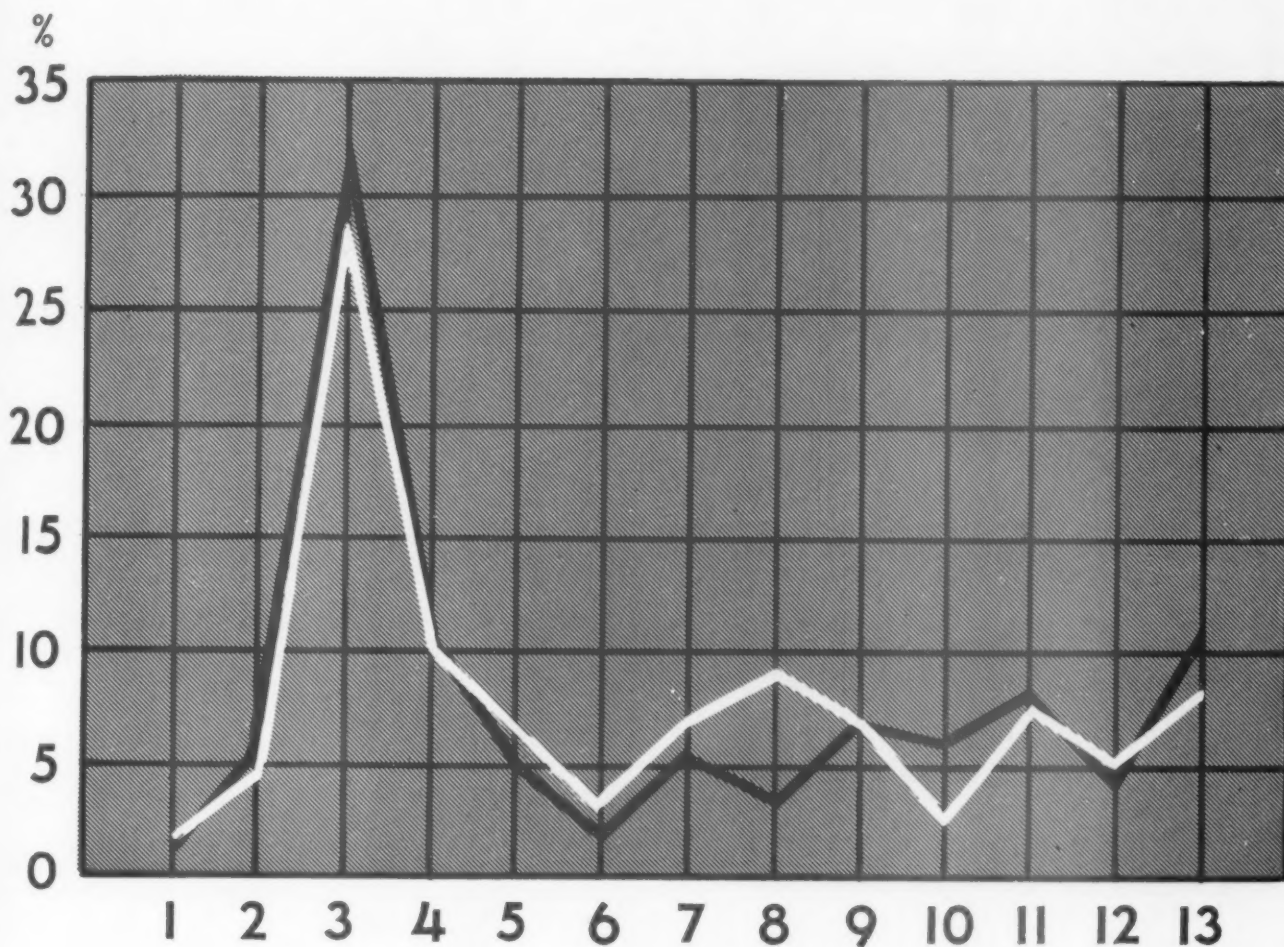
**Utah-Idaho School Supply Co.**, 155 S. State St., Salt Lake  
City, Utah

**Western School Supply Company**, 72 West 2 South St.,  
P. O. Box 266, Salt Lake City, Utah

Chief Manufacturing Company, bleachers, grandstands and  
playground manufacturers

**Z. C. M. I. Stationery Division**<sup>1</sup>, 57 South State St., Salt  
Lake City, Utah

<sup>1</sup> Member National School Service Institute; <sup>2</sup> Member National Audio-Visual Association; <sup>3</sup> Laboratory Supply Distributor.



Types of College Buildings Constructed in 1949

- |                               |                |                                     |
|-------------------------------|----------------|-------------------------------------|
| <b>Legend:</b>                | 5. Engineering | 10. Service facilities              |
| 1. Administration             | 6. Law         | 11. Stadium and gymnasium           |
| 2. Agriculture                | 7. Library     | 12. Student center                  |
| 3. Dormitory                  | 8. Medical     | 13. Multi-purpose and miscellaneous |
| 4. Education and liberal arts | 9. Science     |                                     |

## EDUCATIONAL BUILDING IN 1949

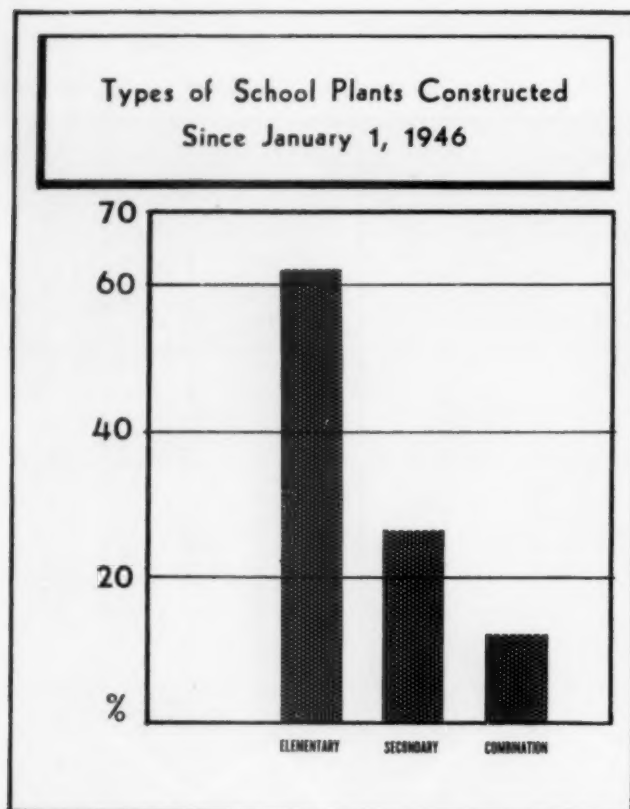
By WALTER D. COCKING

Editor, The American School and University

A LARGE amount of educational building was undertaken in 1949. The building volume and money expended were impressive. Equally significant were new design features, character of planning, and technological processes used. A review of the happenings of 1949 with respect to educational buildings is interesting and valuable because it directs attention to the planning, design, and construction of school and college plants. This consideration still is needed in all sections of the country.

Materials, facts, and other information on which

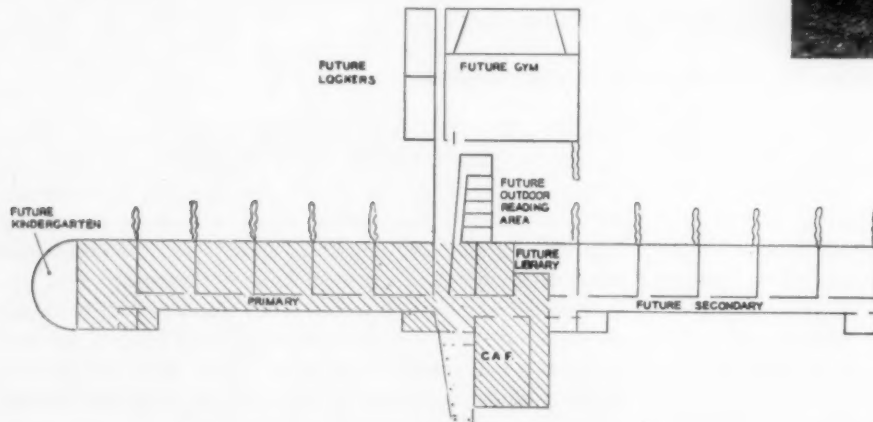
this article is based came from many sources. They include original studies, visits to new buildings, participation in dozens of plant conferences, correspondence, interviews, discussions, and a review of literature. Tying information from so many sources into one connected story is quite a task. Overemphasis undoubtedly has been given to some matters, while others probably have not received the attention they deserve or have been omitted entirely. The chief purpose of this article is to present an accurate overall description of educational building in 1949.



Information from 2,370 school systems showed that 61 per cent had constructed new buildings since the war or were planning construction in 1949. Our figures show that 3,316 public school buildings were constructed during 1949 at a cost exceeding \$1.038 billion.

Contracts were awarded last year for 879 college and university buildings totaling more than \$352 million. These figures do not include colleges with enrollments of less than 1,000 students. Estimates based on facts available indicate that such institutions spent \$50 million for new buildings in 1949.

The total volume of public elementary and secondary and college construction in 1949 was 4,195 buildings with the cost of construction \$1.4 billion. Of



Extended plan of the building  
(shaded part is present school).







Clarksville School, Albany County, New York. Henry L. Blatner, Architect.

*Photo by Robert Damora*

this total cost, 75 per cent was for public elementary and secondary schools, and 25 per cent for colleges and universities. (Figures were not available for the volume of private and parochial elementary and secondary schools constructed in 1949.)

#### **Kinds of Buildings**

Of the total public school buildings constructed, 62 per cent were elementary schools, 26 per cent

secondary schools, and 12 per cent combination elementary and secondary schools. An increase in the construction of secondary schools can probably be expected by 1950, when enrollments will begin to increase substantially.

At the college level many different kinds of buildings were constructed during 1949. Dormitories accounted for more than 30 per cent of the volume of college buildings, and 28 per cent of the total cost.



*Photo by Barbara Morgan*

At Clarksville School, the rolling hills of upstate New York are just a step outside the classroom, near enough to be part of each one.

Liberal arts and education buildings accounted for almost 11 per cent of the total number, and for more than 10 per cent of the total dollar volume. Among these buildings were classroom buildings, fine arts buildings, health and physical education facilities, and homemaking cottages.

Our facts show that agricultural, engineering, library, science, service buildings, and stadiums and gymnasiums each represented between 5 per cent and 10 per cent of the total volume. Student center facilities amounted to 4 per cent. Although medical buildings accounted for only 3 per cent of the total number of buildings, their dollar volume was more than 8 per cent of amount spent for college buildings.

#### **Geographical Distribution**

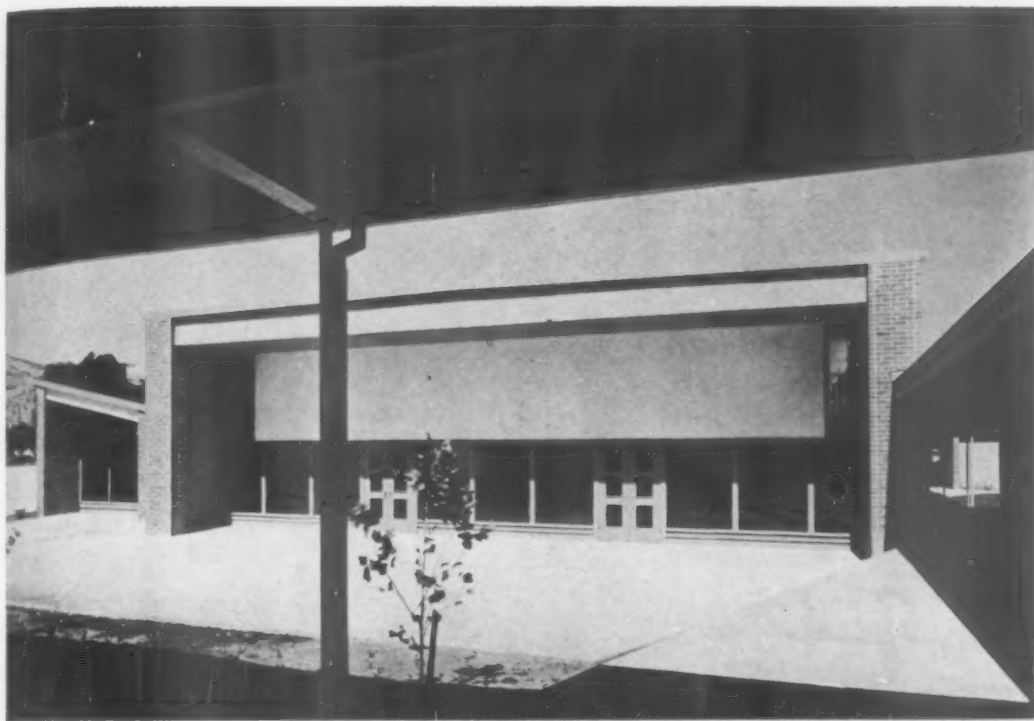
The volume of school buildings constructed since 1945 varies considerably in different sections of the country. The percentage of school districts constructing buildings since 1945 by regions are: New England, 38 per cent; Middle Atlantic, 24 per cent; South, 64 per cent; Midwest, 40 per cent; and West, 73 per cent.

The largest number of new buildings was constructed in the Midwest and the South. The greatest dollar volume, however, was found in the Middle Atlantic states (36 per cent) although only 19 per cent of the total number of buildings was constructed in this region. The western region accounted for 22 per cent of the total number of buildings and for 16 per cent of the total dollar volume. The New England states had 7 per cent of the total number of buildings and 6 per cent of the total dollar volume.

Of all college building contracts awarded, 45 per cent were in the South, representing 36 per cent of the dollar volume. The central states accounted for 25 per cent, and 31 per cent of the total dollar volume. The figures for the West were 14 per cent each for volume and dollars spent. In the Middle Atlantic



Low corridors and simple planes exemplify the child scale size. Large glass areas afford generous view of the outdoors and give the illusion of space. Planned use of color produces a cheerful bright environment.



Above, south wall of the multi-use room in Montecito School. Interior shows the expansive floor area. Folding cafeteria tables make it possible to convert the room, in a few minutes, to a gymnasium. John Lyon Reid, Architect.



states, the totals were 8 per cent of the buildings, 13 per cent of the dollars expended. New England did the least building with only 8 per cent of the total number of buildings and 6 per cent of the total dollar volume.

#### The Cost

Public elementary and secondary school buildings continued to be financed chiefly by local school districts in 1949. Only 19 states provided some state support for new buildings. In most of these states the state aid was a meager amount. Several states took

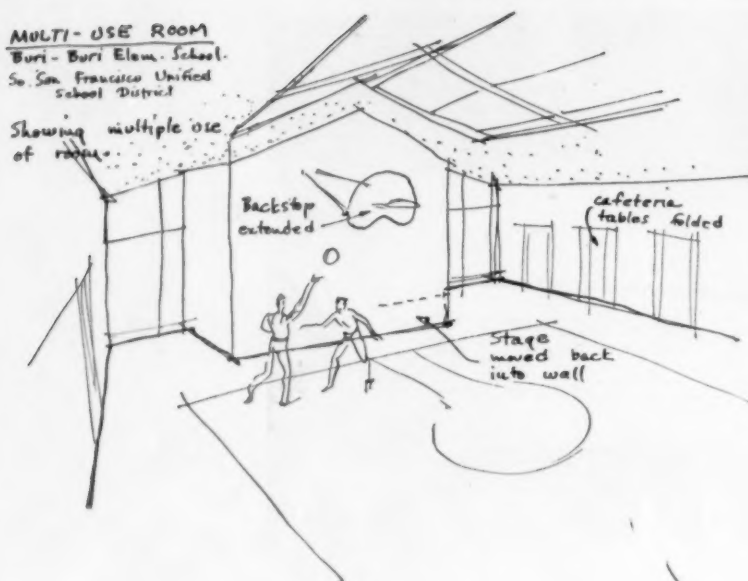
steps to make building aid more substantial, while other states without any building support began to study needs and to develop programs for consideration by state legislatures. Further school building assistance by states seems essential because of the inability of local school districts to finance needed new schools, and also because of increasing acceptance of state responsibility for support of all phases of the educational program including buildings.

During 1949 the cost of new school buildings followed a slight but steady downward trend. The school building index for January was 186.4 (1939



**MULTI-USE ROOM**  
Buri-Buri Elem. School.  
So. San Francisco Unified  
School District

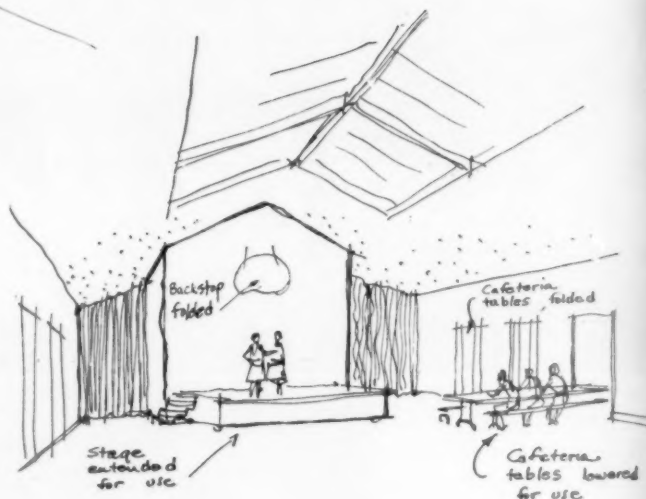
Showing multiple use  
of room.



These sketches of Buri-Buri School, which is still under construction, illustrate the trend of future elementary schools in California. The multi-use room, separate from classroom wings, and provisions for outdoor classes are some of the features that will be incorporated in new plants for more flexibility. John Lyon Reid, Architect.

equals 100), but it was down to 180.8 by December, 1949. Bond rates for this period also showed a downward trend although from July through September the bond rates were higher than in January. The average interest rate on all bonds sold in January, 1949, was 2.36, and in December, 1949, was 1.95.

Plants of publicly supported colleges continued to be financed largely by appropriations; however, spe-



This playroom at Blythe Park School, used day and night by pupils or parents, has a cheery atmosphere and single personality that double-feature gyms lack. Arched trusses, beam and acoustical tile on a pitched ceiling reduce noise to a gregarious, not deafening level. Perkins and Will, Architects.



Community Consolidated School, Palatine, Illinois. Perkins and Will, Architects.

cial gifts occasionally provided the funds. Privately supported colleges continued to depend on gifts to finance all new construction.

Only dormitories and student union buildings failed to follow the above pattern. These buildings were financed chiefly through the sale of long time self-liquidating bonds.

While there is no accurate way of comparing the unit cost of one building with another, the median cost of elementary and secondary schools was approximately \$12 per square foot, varying from \$5 to \$20. For college buildings, the unit cost averaged approximately \$18 per square foot.

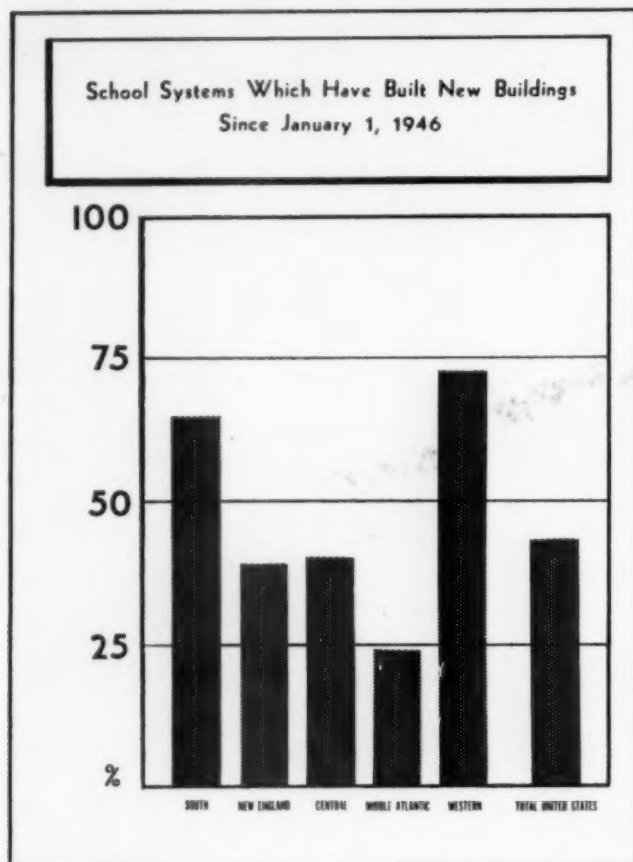
#### Character and Design of Buildings

Reports showed that many plants were designed and constructed during 1949 with little creative planning and little variation from buildings constructed in the 1920's and 30's. The communities in which such buildings are located are entitled to sympathy. They have spent their money and probably mortgaged their future for some time to come on buildings which

are brand new, yet obsolete in terms of present-day education programs, design, and technology.

Happily, the number of school plants designed and constructed with emphasis on today's needs and making use of today's know-how increased markedly in 1949. The approval given to newer conceptions of space design, technological features, and materials insures their continued use. Future buildings should have even more creativeness and daring, and provide ample evidence for the need of additional research and experimentation.

An analysis of these 1949 buildings shows such features as these: Approximately 70 per cent of them are one-storied structures. The modified campus type of plant is the rule rather than the exception. Classrooms are larger and the square classroom is becoming more and more the accepted shape. Special facilities are provided for adult and general community use. Sites are larger: The average size is a plot of more than twelve acres, and many exceed 50 acres. Space is designed so that it can be used readily for a variety of purposes.



A few buildings are entirely air-conditioned. Full fenestration seems to be the goal with more attention devoted to unique designs to control the resulting increased amount of daylight in buildings. Clerestory lighting has become common. There is evidence of much more careful engineering of electric lighting.

The single loaded corridor is used increasingly in the design of elementary school buildings. Facilities for physical education and formal games were emphasized; also room toilets connecting with elementary school classrooms. Basements are definitely on the way out.

School buildings built in 1949 were planned for a smaller number of pupils than was the general rule in the 1920's. Most elementary schools in 1949 were designed for 450 pupils or less, and most secondary schools for 1,200 or less.

#### College Plants

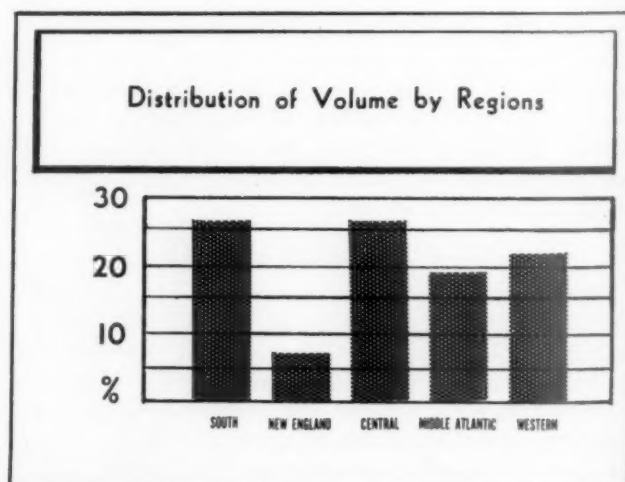
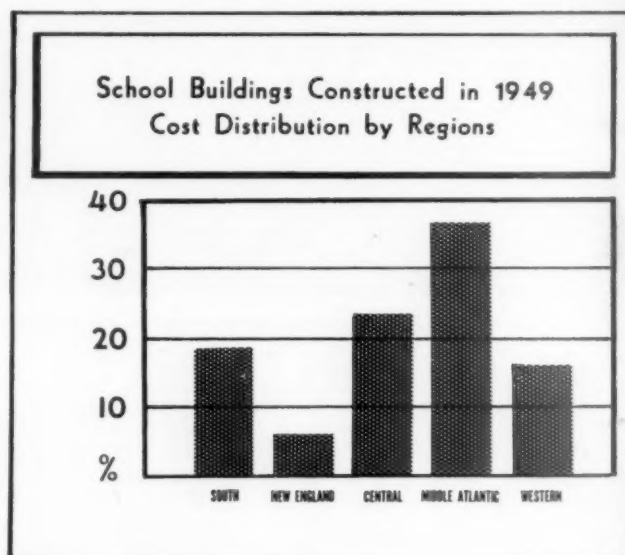
College buildings built in 1949 continued to emphasize massiveness. The buildings were usually several stories in height, and had much more "folderol" on the exteriors than buildings for elementary and secondary schools. Dormitories were the predominant type of college building constructed in 1949. Two main reasons were the tremendous need for additional housing created by huge increases in college enroll-

ments during the last few years, and the fact that most of these structures could be financed on a self-amortizing basis.

Some of the dormitories built in 1949 were departures from the generally accepted policy of building small decentralized structures housing 200 to 400 students. Buildings to accommodate 1,000 or more people were constructed on various campuses. More attention was devoted to designing the rooms so that they were "homes" as well as places to sleep. They also showed a definite effort to provide greater space for social purposes.

Probably because of the increasing emphasis on science in colleges, a rather large number of science buildings were under construction. However, in the main these buildings had few unique design features. Equipment was more distinctive than the buildings themselves.

The most advanced design in 1949 was found in college library buildings. Here the influence of the







Student union designed for Cortland State College, New York. Carl Clark, Architect.

Cooperative Committee on Library Building Plans Report was felt. This committee, composed of librarians, college administrators, and architects, was organized in 1944 and its report was published in book form in 1949 entitled, *Planning the University Library Building*. The report proposed functional design, flexible interiors, lower ceiling heights, book stacks for each floor, and particularly the need for many small conference and study rooms. Some of the new library buildings are certainly quite different from their older counterparts. They have greater utility, adaptability, better lighting, and offer a sensible approach to aiding what goes on in a building.

#### Cleveland College

A unique building in the planning stage is that for Cleveland College located on a corner of the Public Square in downtown Cleveland. This building is interesting for several reasons. Cleveland College is primarily an institution for the part-time education of adults. As yet, America has no building designed primarily for such a purpose. Being located in a downtown metropolitan area it has two quite different types of architecture bordering on it. How to harmonize these architectural differences without the new building appearing as a sore thumb, while at the same time providing the greatest functional use, has created an intricate problem in design. Since the ground area for the new building is very small, the new structure must find its expression upwards.

Most important is the unique planning which is going on and has been for four years. The board of

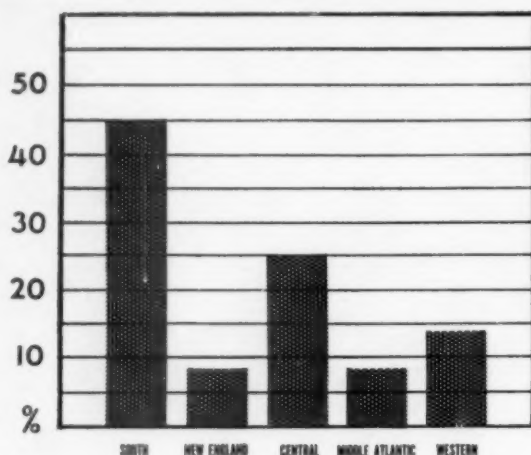
trustees, faculty, and friends of the institution have participated actively and enthusiastically. The program of the institution has been studied thoroughly in terms of the area and people it serves. Four technical conferences have been held. These conferences were attended not only by the local firm of architects and institutional personnel but also by scores of architects, engineers, building specialists, and faculty members from other institutions. Here is an example of group planning which involves interested personnel not connected directly with the immediate undertaking. The techniques used are worthy of emulation by other institutions.

#### The Student Union

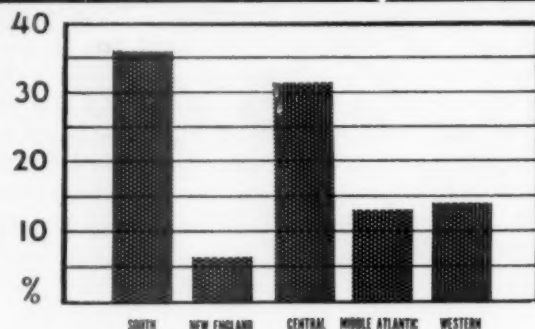
Another type of college building which received considerable attention in 1949 was the student union. Here again in several institutions it appeared possible to obtain financing for this type of building more readily than for strictly classroom structures. This type of building came into favor following World War I and many of them were financed largely by gifts in honor of those who lost their lives in that war. These buildings have demonstrated a need for housing student activities and social life.

During 1949 many more such structures were on the planning boards and several were actually constructed. One interesting issue that has arisen in connection with these buildings and which has come to a head by reason of the greatly increased enrollments in many institutions is: Should there be a central building or a number of buildings strategically

College Buildings Constructed in 1949  
Distribution of Volume by Regions



Cost Distribution by Regions



placed about the campus? No valid answer or trend is yet apparent.

#### The Community College

The growth of the community college has appeared in all sections of the country. Scores of new plants are needed to house these new institutions. What should they be like? What unique features should they possess? No one seems to have the answer. However, in 1949 parts of several such plants were built and others were in the planning stages. It takes no prophetic ability to foresee scores of such new

plants in the next decade. Our observation is (and we are glad of it) that these new plants in design are much more like our better high school plants than the typical college buildings. Study and experimentation are greatly needed now.

#### Cooperative Planning

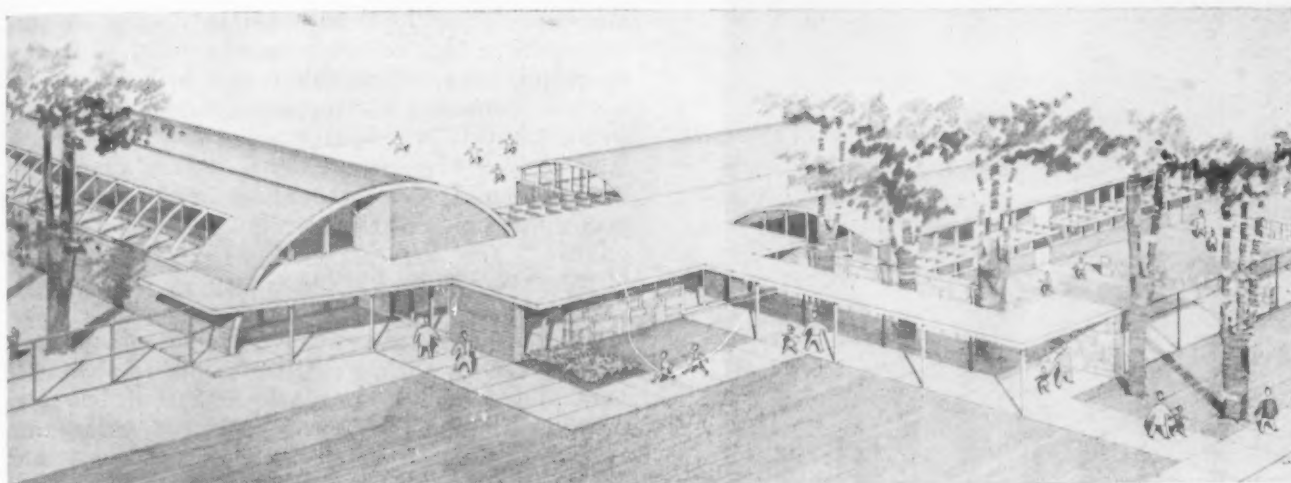
The most wholesome and promising practice found in 1949 in planning and designing educational buildings was the use of many people in the planning procedures. In many communities scores of citizens, school personnel, architects, and consultants worked cooperatively over long periods of time. Their experience and the resulting better buildings have done much to raise cooperative planning from the theoretical to the practical level. No longer do we say, "Is cooperative planning advisable?" We have advanced to the stage where we are concerned now with what procedures give the best results. The year 1949 may well go down in history as marking the general acceptance of cooperative planning as essential to good building results.

#### Materials and Construction Methods

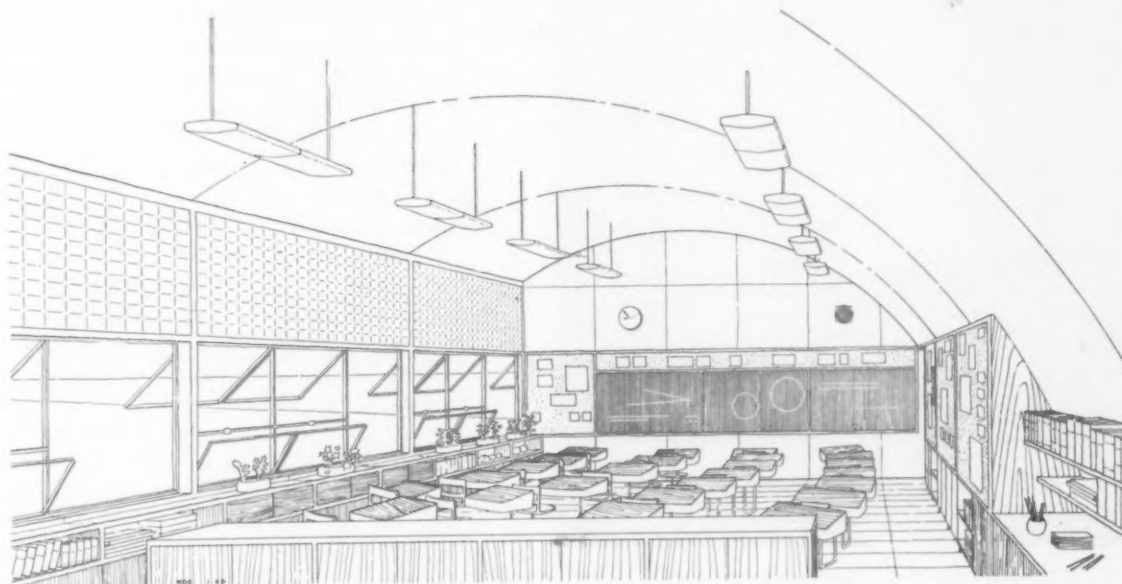
No basic changes occurred in 1949 in the kinds of materials used in school buildings. Several interesting adaptations of materials were made and some refinements of materials were used. Changing emphases on the use of various materials over others were noticed. The situation probably can be sum-



Large building products such as wall panels and precast slabs have helped to speed up production and cut down labor costs.



Lightweight arched skeleton all-in-one-piece structure was designed by Churchill-Fulmer Associates.



Above, perspective of classroom. Arched ceiling gives maximum in acoustics and natural lighting. Students' desks are placed for natural lighting and reduction of glare.

marized as follows: Those concerned with construction of school plants in 1949 showed great interest in materials and methods of using them. Emphasis was upon refinements of traditional materials. Considerable experimentation in new use of materials was carried on. Several new departures seemed to meet with approval.

Cement is the only major material used in building construction which has not advanced markedly in price since 1940. Also, this material has been available in good quantity in most sections of the country. These reasons undoubtedly have influenced its increased use in columns and spans as well as entire exterior surfaces. An accelerated use of concrete in future buildings is forecast.

Several 1949 educational buildings used aluminum as an exterior wall surface, and again increased use of this material is predicted in future buildings. Use of prefabricated materials found increasing favor,

probably because of the savings in labor. Plastics and wall boards of various kinds were used frequently in 1949 buildings. The demand for greater flexibility has emphasized the use of movable partitions. The constant search for lighter materials with durability and strength has also led to greater experimentation with plastics.

There was a tendency in 1949 particularly in elementary school buildings to use wood, especially pine, for room and corridor wall surfaces. Beauty in appearance, saving of labor costs, and increased utility of walls were some of the advantages claimed.

The amount of space devoted to chalkboards continued to decrease in 1949 buildings. Experimentation with various chalkboard surfaces continued. Glass chalkboards were installed in numerous buildings,





however, composition boards painted to provide surfaces with a high reflective value seemed to receive increasing favor. Reversible boards with one surface a chalkboard and the opposite a tackboard were frequently installed. In all types of educational buildings in 1949 there was a trend toward the use of movable chalkboards, or boards set in movable frames rather than into the room walls.

#### Floors, and Radiant Heating

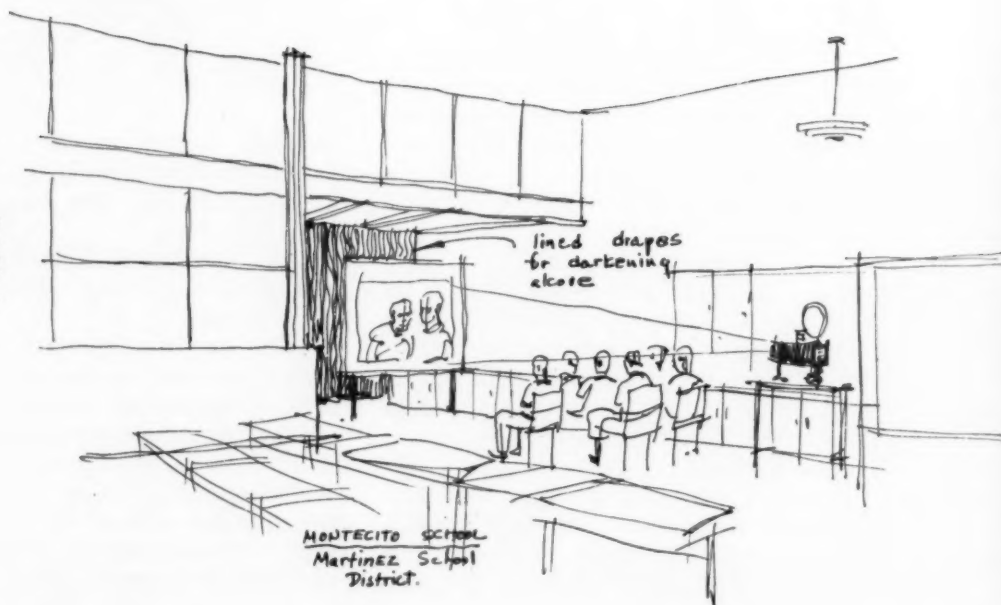
The trend with respect to classroom, office, and corridor floors in educational buildings of all kinds in 1949 was toward asphalt tile applied to a concrete base. Lighter colors of asphalt dominated; one more bit of evidence of the growing concern to obtain high reflective values from all surfaces. Linoleum and cork coverings still met with favor in 1949. School-people were experimenting with rubber and rubber compounds.

Radiant heating was used increasingly in 1949, and in all types of buildings and in all sections of the country. Debate and experimentation continued with respect to the room surface in which the installation should be made for best results. Floor installation was most frequent, though installation in ceilings



Two views of the L-shaped classroom designed for Montecito School. Upper left shows the pleasant daylighting and ample chalkboard space; lower left, the alcove for visual aids. John Lyon Reid, Architect, California.

Audio-visual aids are easily made a part of classroom work at Montecito School. Note how the alcove can be transformed into a "theater" without darkening the entire room.



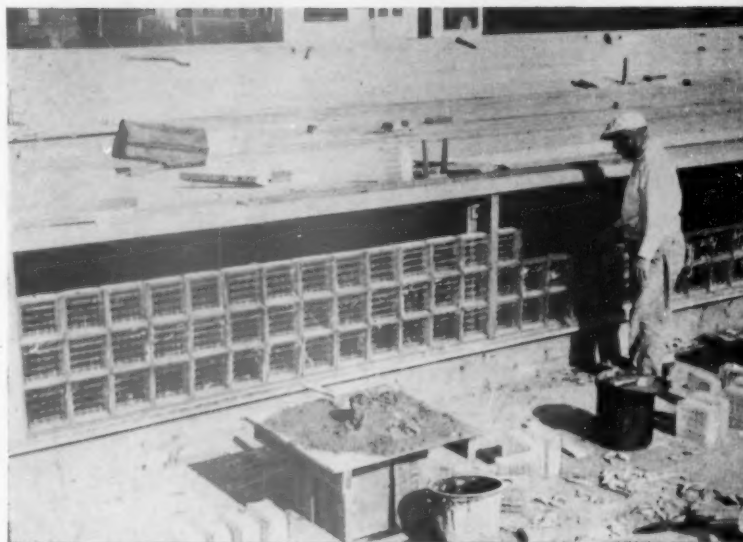
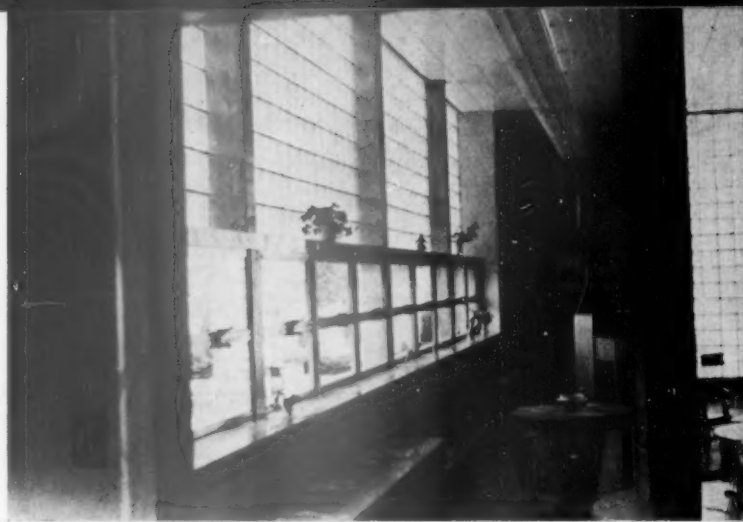
was relatively common. Side wall panel installation was tried in a few buildings.

An important note is the accelerated attention to treating all areas in the building acoustically. Prior to World War II few spaces in most educational buildings had proper acoustical treatment. In 1949, most of the new buildings received some acoustical treatment, especially in classrooms, corridors, auditoriums, cafeterias, music, art, and shoprooms. What a welcome change from buildings constructed prior to 1930! The amount, extent, and manner of acoustical treatment have received serious attention and study by architects and engineers.

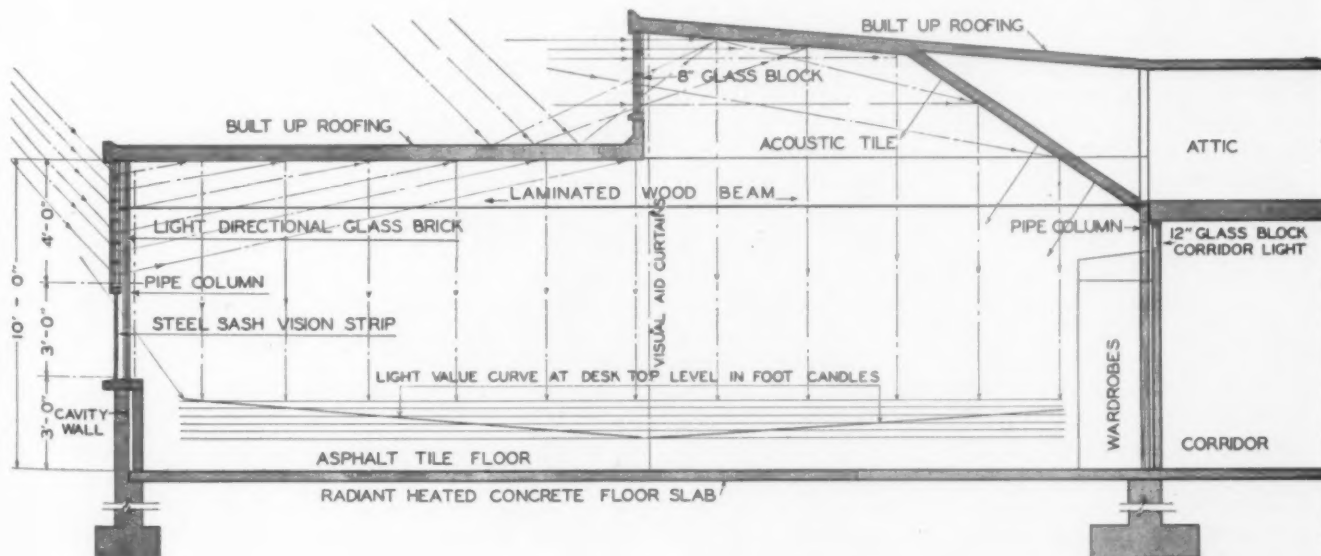
#### Lighting for Good Seeing Conditions

Buildings constructed in 1949 reflected the continuing emphasis on providing good seeing conditions. Greater percentages of wall areas were devoted to glass. Bilateral lighting was common particularly in one-story buildings where it was easy to design clerestory windows. There was some tendency to lower the heights of windows from the floor, but apparent uncertainty regarding the merits of this issue. Use of directional glass block increased, though some designers made less use of this material. The developing trends toward full modular coordination and greater interior flexibility helped to bring full fenestration as an accepted design practice in most elementary and secondary school buildings.

Fluorescent lighting was installed more frequently in more types of spaces. In a number of buildings luminous ceilings were found in classrooms and offices. Several promising research inquiries and experiments were under way in 1949 which sought better coordination of lighting, air conditioning, and acoustics. One must conclude that much of the present design

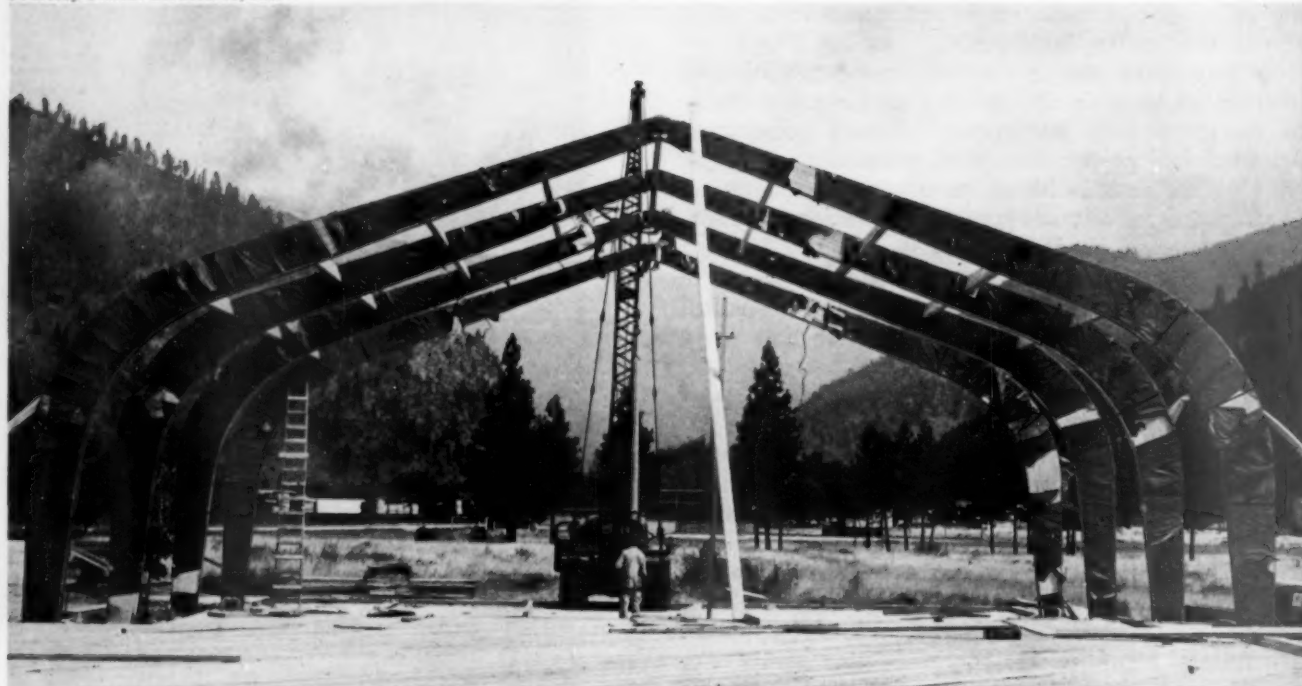


Glass block provides a high ratio of window to floor area with little heat loss because of its insulating properties. Directional block is used in the east, west and south and ordinary block in the north where the sun seldom hits. Free standing pipe columns are used on the inside of the glass block wall. A continuous strip of glass block is used next to the ceiling along the corridors, eliminating the necessity of windows or skylights.



Diagrammatic classroom section showing distribution and uniformity of daylighting in Washington School classrooms, Centralia, Washington. William Arild Johnson, Architect.

*Courtesy Timber Structures, Inc.*



Timber as a structural material has come of age with new fabrication, lamination and construction techniques. Boomerang arches, used in Bonner School gymnasium, Missoula, Montana, provide wide room clearance. Fox and Billas, Architects.

with respect to lighting is based on beliefs and prejudices, with final and complete facts largely absent.

#### **Construction Processes**

The trend in 1949 continued away from heavy massive school buildings toward light simple structures. As W. W. Caudill of Texas and others have pointed out, the light simple structure is the result of the use of repetitive bays; non-load bearing partitions; fewer and larger building products; and speedy erection techniques. All of these characteristics were more frequently used in whole or in part in 1949 educational buildings. Structurally the buildings were of rigid-frame concrete, rigid-frame steel, or stran-steel system thus reducing labor costs while facilitating expansion. Longer construction spans (steel, concrete, or laminated wood beams) were used increasingly. More interior walls were non-load bearing, and all utility conduits and fixtures were attached to outside or corridor walls. Welding took the place of riveted joints. Roof and wall slabs were precast and simply set into place. Steel decks for walls and floors were more frequently used. Concrete forms were laid on the ground and the slabs raised into place, not only saving labor costs but also permitting the reuse of the forms.

The year 1949 evidenced an increasing trend toward modular coordination as more building product manufacturers cooperated toward the production of materials which fitted into the system. Many years may elapse before modular coordination is complete but accomplishments in that direction are encouraging

to say the least.

Progress in the overall economical and wise use of materials in educational buildings was sufficient to incite greater efforts. More effective and economical construction processes may offer the chief means for designing and constructing educational buildings at a lower cost.

#### **New Legislation in 1949**

In practically every state, increasing consideration is being given to additional legislation which will assist in meeting the needs for new school plants. Most of the proposed legislation is directed at financing these plants. Two types are receiving most consideration. One form of legislation is a large sum appropriation for immediate use to enable the state to meet pressing needs. The other form of legislation deals with the long time and permanent program through which the state accepts responsibility for sharing in the financing of new plants.

Examples of noteworthy plans receiving legislative approval in 1949 were those in California, Delaware, and Connecticut.

The citizens of California voted a statewide bond issue of \$250 million to be used to aid construction of new plants in more than 400 school districts. These distressed school districts have largely exhausted local financial resources and are unable to provide adequate facilities for increasing enrollments through their efforts alone.

The State of Delaware's 115th General Assembly made provision for a \$19,302,543 school construction



program, the state contributing two-thirds of the money and local school districts contributing one-third. The act also established a school building program board to consist of the governor, secretary of state, and the president of the state board of education. This board considers the plans, costs, and specifications of any school construction proposed and determines the need for new school construction.

The General Assembly of Connecticut enacted a twenty-year program of state aid to towns for school building construction. Grants were made available for one-third of the cost of construction begun between July 1, 1945, and July 1, 1959, with upper limits set at \$300 per elementary pupil and \$450 per secondary student. Special assistance may be provided to towns unable to finance projects from regular grants.

Notable progress in providing state aid for new school construction was made also in the states of Maryland, Massachusetts, North Carolina, and West Virginia.

While Congress considered many bills in 1949 to provide financial assistance to states for school plants, no action was taken. Additional appropriations were made to provide some assistance in planning new pub-



Laminated beams get the building under roof quickly so that the remainder can be completed under cover.

lic works, and schools and colleges are included under the interpretation of this legislation. Also, the Federal Government did provide some direct financial assistance to those districts which were compelled to construct new school plants because of increased en-



Radiant heating is used increasingly, mostly in floors. Some schools have tried ceiling installations and a few, side wall panels.

rollments brought about by shifting of population to areas in which large governmental activity took place.

#### New Literature

A considerable amount of new literature on school and college plants became available during 1949. Five books of particular value in planning educational plants were published; educational and architectural magazines presented some good editorial material.

*American School Buildings*, the 27th yearbook of the American Association of School Administrators, provides a good analysis of building planning and procedures. It contains a list of 197 recent references to particular topics discussed in the yearbook. This book was prepared by a special commission headed by W. T. White, superintendent of Dallas Public Schools, Texas. The membership of the commission included educators, plant specialists, and architects.

*Schools*, by Lawrence B. Perkins and Walter D. Cocking, was published by Reinhold Publishing Corporation, New York. An architect and an educator present a forward-looking consideration of the problems involved in planning and designing school plants. This book is very well illustrated with pictures of modern school plants and spaces.

*Planning Secondary School Buildings*, a new book on secondary schools, was also published by Reinhold Publishing Corporation. Its authors are N. L. Engelhardt, N. L. Engelhardt, Jr., and Stanton Leggett. Detailed consideration is given to problems met by planners of secondary school plants.

*Planning and Modernizing the School Plant*, by Merle A. Stoneman *et al*, was published by the University of Nebraska Press in 1949. This is a manual which brings together accepted practices and standards documented with quotations and statistics for carrying through a building project in a small school.

*Planning the University Library Building*, edited by John E. Buchar *et al*, is a report of the Cooperative Committee on Library Building Plans, published by the Princeton University Press. The committee considers problems common to institutions of higher

learning concerned with planning library buildings.

The January, 1949, issue of *THE SCHOOL EXECUTIVE* was devoted entirely to school plant trends. Special attention was given to trends in types of units, structural design, facilities, and physical well-being. During the year each issue of the magazine devoted attention to building problems and will continue to do so.

*College and University Business* each month presents descriptions of specific college buildings such as Small College Union Building, Apartments for Illinois Married Students and Faculty, Service Building at the University of California, University of Florida's New \$1,650,000 Gymnasium, and Cafeteria Completes Its First Year.

The outstanding issue of an architectural magazine was published by the *Architectural Forum* in October, 1949. This issue presents ways toward better schools, case studies of buildings, and new technical methods of design and construction.

The May, 1949, issue of the *Bulletin of the American Institute of Architects* presented an outstanding article entitled Symposium on College Residence Halls. The material was a building type reference guide and supplement to Building Type Reference Guide, No. 6, College Residence Halls.

Other magazines which devoted special attention to school buildings in 1949 were: *American School Board Journal*, *Nation's Schools*, *School Management*, *Architectural Record*, and *Progressive Architecture*.

Several noteworthy pamphlets were published in 1949. United States Office of Education published a pamphlet entitled *College Building Needs*. It presents a summary of a study of existing college space in relation to needed college buildings and the means for providing them.

Many local school systems published material on school buildings. Illustrative of this type of material was the excellent pamphlet produced by the Dearborn Public Schools, Michigan. The title, *The Elementary Program Designs a New School*, suggests the attitude and approach used in developing new buildings.



Antiquated buildings like this should be set aside as historical sites and not be expected to house modern educational programs.

## EDUCATIONAL PLANT NEEDS

By RAY L. HAMON

Chief, School Housing Section, U. S. Office of Education, Washington, D. C.

THE nation is faced with a grave shortage of educational plant facilities, and the situation threatens to become chaotic unless immediate and drastic action is taken. Thousands of children in every state today are required by law to attend school in buildings that are totally unsatisfactory. Other thousands are attending school in overcrowded and makeshift classrooms. An increasing number of pupils in several states are attending school for only half-day



Dr. Hamon is a native Minnesotan. He attended the University of Florida, receiving a B.S. degree. He secured an M.A. from George Peabody College and a Ph.D. from Teachers College, Columbia. He then served in Florida schools in various capacities until the beginning of World War II when he accepted a war-service position with the U.S. Office of Education, gradually advancing to the position he now holds.



sessions. Under such conditions, not only are pupils given inferior educational opportunities but the money spent for their education is only partly effective.

#### Increased Enrollments

The present acute shortage of elementary and secondary school plant facilities is a result of a number of factors. The greatly increased birth rate during the war and early postwar years has resulted in a marked increase in school enrollment, and the increase may be expected to continue for several years to come. This situation is indicated by Table I, which is based on recent forecasts of total elementary and secondary school enrollments in both public and non-public schools of the United States. As shown by this table, the peak enrollment in grades K-12 will be reached in the school year 1957-58, thus resulting in a net increase of 10.5 million pupils over the 1946-47 enrollment. Calculated on the basis of thirty pupils per classroom, this one factor alone will require 350,000 new classrooms. (The term "classroom" includes shops, laboratories, and other special instruction rooms as well as regular classrooms.)

#### Deferred Construction

School construction not only stopped during the war in all except a few war-congested areas, but even repairs were neglected. Many thousands of children are now housed in obsolete, unsafe, and totally unsuited facilities. Until a careful study is made in all states, it is not known what proportion of the present enrollment should be rehoused. Great population shifts during the war brought serious school-plant situations to many communities. According to

information currently available, 150,000 obsolete, unsafe, and poorly-located classrooms should be replaced by new facilities.

#### Reorganization and Expanding Programs

In many states a large proportion of the existing school districts are so small that enrollments do not justify the maintenance of a school. Many districts have such limited resources that children's educational needs are not being met.

Several states are now reorganizing their local school districts. Within the next few years thousands of small and unsatisfactory schools should be replaced with larger modern and properly located facilities to provide more adequate school services at reasonable costs. Many states are in the process of establishing or expanding kindergartens. In various sections of the country secondary education is being extended to include grades thirteen and fourteen. These reorganization and expansion programs will require an estimated 100,000 new classrooms.

#### Elementary and Secondary Needs

Taking these three factors into consideration, present estimates indicate that approximately 600,000 elementary and secondary school classrooms must be provided from 1947 to 1960.

Assuming that 50,000 classrooms have been built since the war, and that another 50,000 needed classrooms will be built by non-public schools, there is still need to erect 500,000 public elementary and secondary school classrooms during the next decade.

Classrooms alone will not suffice. A school plant suitable for the accommodation of educational programs to meet today's demands requires such supplementary spaces as libraries and reading rooms; health and physical education facilities; lunchrooms; administrative and counseling rooms; service and sanitary facilities; and assembly space for music, dramatics, and public forums.

The bill for 500,000 classrooms plus all of the necessary supplementary space and equipment and furnishings, exclusive of land, will be on the average at present prices approximately \$27,000 per classroom unit, or \$13.5 billion.

#### Some Previous Estimates

In 1948, 31 states reported to the U. S. Office of Education their public elementary and secondary school building needs for a six-year period. Those estimates when projected for the nation on a population basis amounted to more than \$9 billion. Similar reports to the Council of State Governments totaled nearly \$8 billion for a five-year period. In October 1949 *School Life* estimated that \$10 billion would be needed for public elementary and secondary school plants between 1950 and 1960. Recently revised forecasts indicate that enrollments will be considerably higher than those on which the above estimates were based. The writer believes, therefore, that his current

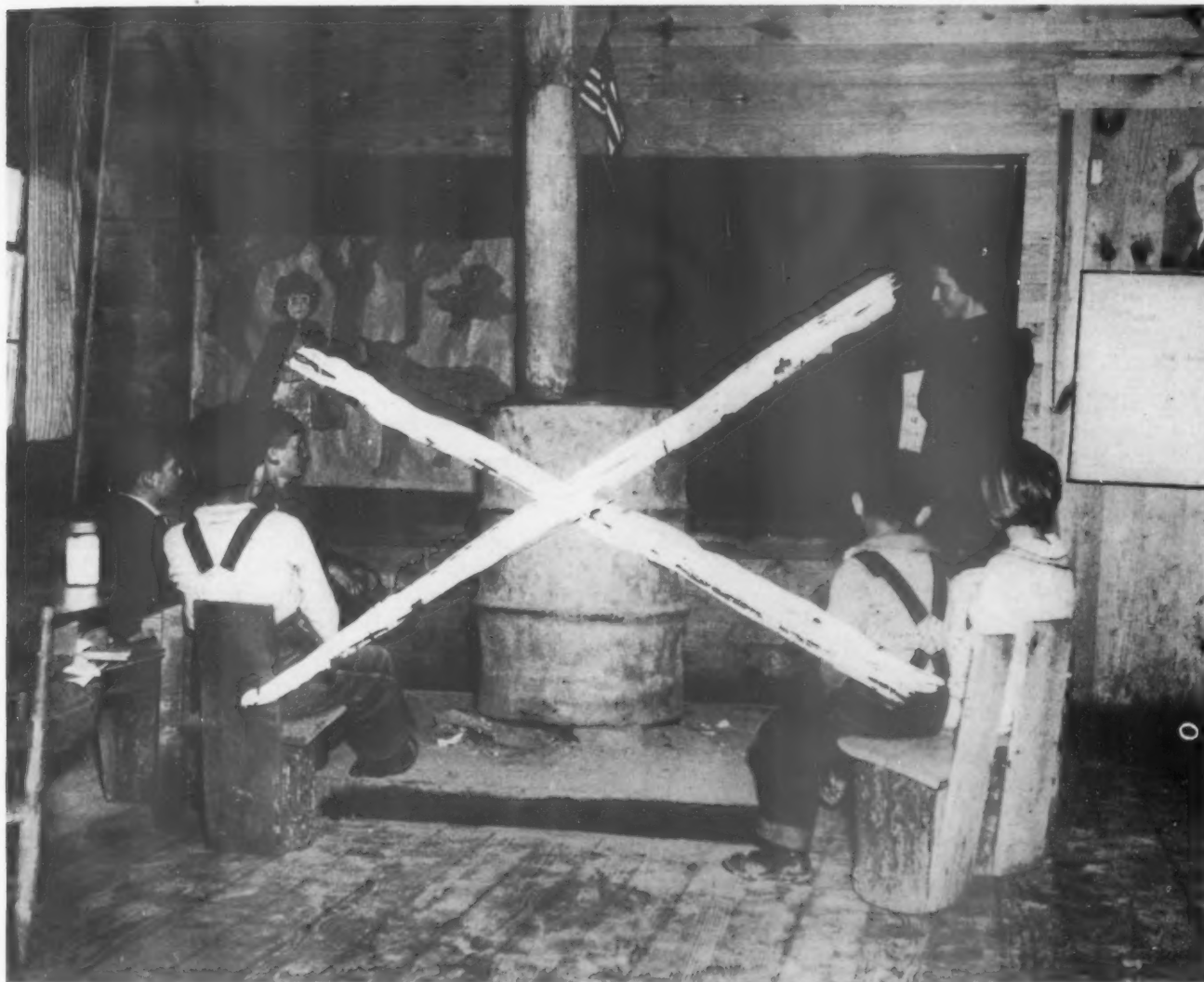
TABLE I

FORECAST OF ELEMENTARY AND SECONDARY SCHOOL ENROLLMENTS<sup>1</sup>

School Year	Elementary (K-8)	Secondary (9-12)	Total (K-12)
1946-47	20,211,900	6,458,800	26,670,700
1947-48	20,690,900	6,505,000	27,195,900
1948-49	21,736,500	6,397,900	28,134,400
1949-50	22,759,800	6,240,400	29,000,200
1950-51	23,686,000	6,141,700	29,827,700
1951-52	24,467,600	6,167,900	30,635,500
1952-53	26,064,300	6,262,400	32,326,700
1953-54	27,453,000	6,408,400	33,861,400
1954-55	28,651,900	6,557,500	35,209,400
1955-56	29,333,700	6,825,200	36,158,900
1956-57	29,497,700*	7,286,200	36,783,800
1957-58	29,432,800	7,753,400	37,186,200*
1958-59	29,004,000	8,101,000	37,105,000
1959-60	28,789,200	8,348,800*	37,138,000
Increase of peak over 1946-47	9,285,800	1,890,000	10,515,500

\* Peak for 13-year period.

<sup>1</sup> Adapted from "Magnitude of the Nation's Educational Task Today and in the Years Ahead," *School Life*, March, 1950.

*Photo from Farm Security Administration*

The one-room school is obsolete. Today's program demands libraries, reading rooms, health and physical education facilities, lunch-rooms, administrative and counseling rooms, service and sanitary facilities, assembly space for music, dramatics, and forums.

estimate of \$13.5 billion for public elementary and secondary school plant needs for the next decade is not excessive. Unless building costs come down materially, it is more likely that this estimate is too conservative.

#### **Plant Needs of Higher Education Institutions**

College and university enrollments naturally declined during the war period. Due to deferred college attendance and veterans' educational programs, college enrollments shot up again after the war far beyond prewar levels. Because of a growing public awareness that America's role in the modern world demands more and better prepared leaders in all professional and technical areas, college and university enrollments will continue to increase.

The 1941 fall enrollment in all types of both public and non-public institutions of higher education was 1,180,000. This figure dropped to 1,074,000 in 1945,

increased to 2,078,000 in 1946, and continued to increase to 2,457,000 in 1949.

Increased college and university enrollments from 1941 to 1949 have been accommodated, after a fashion, by increasing the efficiency of plant utilization to a maximum, overcrowding beyond the point of diminishing returns, and by the use of temporary war surplus facilities. A continued high degree of utilization should be encouraged; but overcrowding should be relieved, temporary facilities replaced, and additional facilities provided for further increases in enrollments and program expansion.

If it could be assumed that desirable increased utilization plus permanent construction since 1941 will offset deferred replacement of obsolete facilities, there still remains the urgent demand to double the permanent capacity of American colleges and universities.

College and university administrators have estimated their minimum needs for the next ten years at

170 million square feet of non-residential plus 95 million square feet of residential space, or a total of 265 million square feet of floor space in new buildings. This amount of college and university building area plus equipment and furnishings, but exclusive of land, will cost at present prices approximately \$5 billion. According to space requirements estimated by institutions in a recent study, this may be divided roughly according to type of institutional control as follows: \$2.75 billion for public institutions and \$2.25 billion for non-public institutions.

These estimates of educational plant needs are based on normal construction tempo for a ten-year period.

#### A \$20-Billion Program

A division between labor and material costs is usually calculated at the site. This, however, does not give a true picture of the labor involved. There are 1.5 man-hours of off-site labor for every man-hour of on-site labor. To this must be added administrative and professional labor, and the labor involved in transportation through the various processes and to the building site. In other words, when the costs of an educational plant, exclusive of land, are traced back to lumber on the stump and metals and masonry materials in the ground, the costs are practically all labor.

When all types of both on-site and off-site labor are considered, from common unskilled labor to architects, it may be assumed that the equivalent of one man-year costs approximately \$4,000. Table II shows a summary of the foregoing estimates in dollar volume and also translated into man-years of employment.

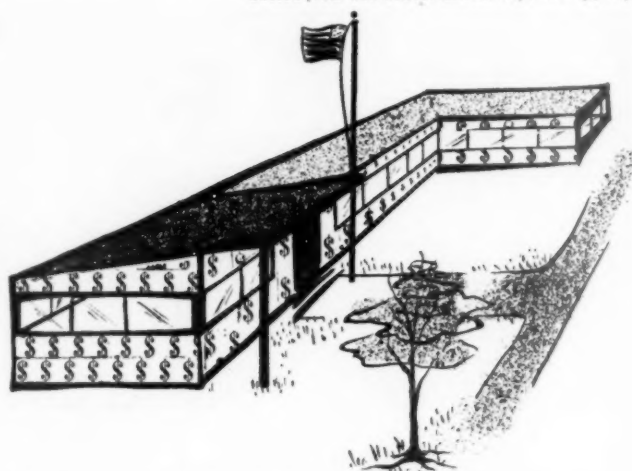
TABLE II

ESTIMATED COST AND MAN-YEARS OF EMPLOYMENT FOR A TEN-YEAR PROGRAM OF NEEDED EDUCATIONAL PLANT FACILITIES

Type of Institution	Cost in billions of dollars, exclusive of land	Millions of man-years, both on- and off-site
Elementary and Secondary		
Public	13.50	3.38
Non-public	1.50	.37
Higher Education		
Public	2.75	.69
Non-public	2.25	.56
<b>Total</b>	<b>20.00</b>	<b>5.00</b>

This estimated \$20 billion educational plant program is based on the needs for ten years. However, because of deferred construction and enrollment increases already realized, a large proportion of the need is current. Under normal economic conditions, these needs may be met in ten years by providing 10 per cent of the needed facilities each year. This would make it necessary to continue many unsatisfactory plants for a few more years and to continue some serious overcrowding in certain areas.

Sketch from *The School Executive*, January, 1949



An estimated \$13.5 billion for elementary and secondary school plant needs between 1950 and 1960 is not excessive; in fact, present building costs make the amount rather conservative.

An educational plant program, especially the larger portion which is under public control, can be timed by public policy to conform to the economic cycle. Such a program also lends itself to area employment. For example, should unemployment threaten in the building industry in a certain section of the country, the public educational plant program could be stepped up in that area to meet the situation. If such a condition should develop on a nationwide basis, the tempo of the public educational plant program could be accelerated by increasing federal, state, and local appropriations for this purpose. Even if three-fourths of the \$20 billion program were erected during the next four or five years, the facilities provided would not be in excess of contemporary needs.

Questions may be raised in some quarters as to why the educational plant program should be based on the estimated peak load; and, if such a program were realized, would there not be many vacant rooms following the peak.

There is no assurance that enrollments will materially decline during the 1960-70 decade. In fact, increases in enrollments may be expected in the kindergarten, in grades thirteen and fourteen, and in institutions of higher education. The estimates are based on an average of thirty pupils per classroom, which is neither feasible nor desirable. A more desirable average would be 25 pupils per room, thus requiring 20 per cent more classrooms. As educational programs expand and as the schools realize their responsibilities for providing and operating community facilities, the demands for space will increase beyond those contemplated in the foregoing estimates.

Educational plant programs likely will not advance at a tempo which will replace all obsolete structures within the decade, nor do the foregoing estimates of need contemplate such a tempo. If enrollments should decline after 1960, some of the worst plants, which now have to be patched up and continued in service, can be abandoned. No, the danger of overbuilding is



nonexistent, provided facilities are properly planned and properly located.

#### Developing an Educational Plant Program

Even if \$20 billion is made available from all sources during the ensuing decade, that in itself will not assure satisfactory educational housing. This is only a means to an end. To accomplish the end objective, continuous intelligent planning is essential. The development of an adequate and suitable educational plant program will require the cooperative efforts of school and institutional boards, educators, architects, area planners, and lay groups. The primary leadership for planning an educational plant program must be the responsibility of the appropriate educational agencies at the local, state, and federal levels. The total educational plant program may be divided into several steps or phases as follows:

**Program Planning:** Satisfactory educational results and economical financial investments in an educational plant program can best be attained by overall plant programs developed through comprehensive statewide studies. The scope of such studies should include: population trends; a comprehensive picture of school and community services; local unit organizational structure; adequacy of existing facilities; advisable rehabilitation of present plants; the location, type, and size of needed new facilities; probable priority schedule of expansion and improvement programs; and a plan for financing the contemplated program.

**Site Acquisition and Development:** Many school and college sites are so inadequate and so poorly located that the educational and community service programs they were intended to house are severely restricted. Site selection should be coordinated with overall city, county, and large-area planning and zoning. Site areas must be sufficient to allow for future building expansion, necessary drives and parking spaces, suitable planting; and to provide year-round school and community recreation programs.

**Design and Construction of New Facilities:** School and college facilities should be planned and designed cooperatively for functional adaptation to current and anticipated program needs of the individual institutions and departments. Although state regulations and guides are essential, the local educational staff, architects, consultants, and lay groups should supplement state requirements by tailoring each facility to fit specific needs and conditions. Coordination of these planning activities is one of the principal responsibilities of the local educational administrator.

Drawings should not be commenced for a structure until specific requirements and facilities have been determined as design data. The staff should check and recheck specific requirements before design advances beyond the preliminary stages. They should ask questions such as: Have we provided sufficient facilities for our school lunch program? Have we allowed space for the health suite? Do we want individual classroom toilets? Has adequate provision

been made for work counters, sink, and storage space in the elementary classroom? Is the library well located, and does it have adequate reader and book capacity for our program?

**Modernization, Rehabilitation, and Renovation:** Since it is not practicable to replace all substandard buildings immediately, educational officials should consider which structures are properly located and sufficiently sound to justify modernizing and renovating them for continued service. For safety and health, many buildings need new stairs, floors, roofs, heating plants, and plumbing. Many buildings should be relighted and redecorated for conservation of eyesight. Much of the old furniture should be refinished and some should be replaced with new units. Obsolete blackboards should be replaced with light-colored chalkboards.

**State Responsibility:** During the past fifteen years there has been a growing feeling on the part of state educational agencies that federal agencies are encroaching on state prerogatives in the administration of various federal programs which affect education. This encroachment, in some cases, may have been due to the fact that federal agencies felt it necessary to move into certain areas to fill vacuums which existed at the state level. The best way to prevent the continuation or recurrence of such practice is for state educational agencies to fill these vacuums themselves with state agency programs backed by state laws.

Satisfactory educational plant programs cannot be developed on a long-range comprehensive basis without positive leadership and active participation of state educational agencies in all phases of the program. As indicated by a recent study, 32 states have state school plant regulations or require state approval of plans, but only 27 states maintain educational plant specialists in their state departments of education, and some of these plant specialists have other duties and responsibilities. Only fifteen states maintain more than one full-time professional specialist in this area.

If state educational agencies are to fulfill their obligations and meet the challenging opportunities to exercise state leadership in the development and administration of comprehensive educational plant programs, it is essential that suitable state legislation be enacted and adequate professional personnel be provided in the field of educational plants. Educational plant divisions of state departments of education should be staffed with personnel trained and experienced in the broad field of educational administration with specialized training in educational plant problems. To assure a high level of continued performance of these divisions, the personnel must be protected by salary schedules and tenure policies which will attract and hold professional career men.

#### Financing School Plant Construction

The principal source of capital outlay funds for public elementary and secondary school plants is from local school districts, and these small governmental

units usually must depend upon taxation of real property. Most local districts are not able to finance their needed school construction from local sources alone. This situation would be improved, but not corrected, by combining districts into larger local administrative units.

State aid for current school expenses has been an accepted pattern for many years. In 1947-48 about 40 per cent of all revenue receipts for public elementary and secondary school current expenses came from state sources. Until recently, however, states have not taken seriously their obligation to use state funds to assist in school construction costs; but there is now a definite trend in that direction. Twenty-three states now make some contribution from state sources to assist local units in financing capital outlay, although the amounts from state sources may be considered as significant in only thirteen states.

An urgent problem now facing state educational agencies is the provision of adequate amounts and the development of sound policies of administering state aid for capital outlay.

The Federal Government participated in financing public educational plant facilities in connection with

several temporary emergency programs during the depression and war periods. Various emergency programs, although developed for other purposes and temporary in nature, were beneficial in providing needed educational plants in certain communities. However, these federal assistance programs had objectionable features, and they were never sufficient to enable the public schools to satisfy more than a minor portion of their plant needs.

There are certain fundamental principles which should be observed in any federal aid program for the planning and construction of public elementary and secondary school plants. Administration of the program should be through the regularly constituted federal and state educational agencies. Allotments should be made on a statewide basis to state educational agencies for their use in assisting local units in accordance with approved overall state program plans. The federal allotment formula should be based on the needs and relative financial ability of states. States should be encouraged to contribute state funds for capital outlay, and to distribute state and allotted federal funds in accordance with the needs and financial ability of local units.

# TRENDS IN PLANNING SCHOOLS

The American Institute of Architects Merit Award for  
School Buildings—Houston, Texas, March, 1949

By **WALTER W. HOOK**

Walter Hook and Associates, Inc., Charlotte, North Carolina

**I**N INSTITUTING its Annual Merit Award for Design at Houston, the American Institute of Architects selected the home and the school as subjects.

The thirty-six projects submitted in School Design represented twenty-five A.I.A. chapters located in sixteen states. They were mainly from the west and central states, with the east, south and southeast conspicuous by their absence.

Entries were first submitted in chapter competitions where drawings and photographs were screened. Each chapter was allowed a maximum of five entries. A jury of three architects, one educator and one school administrator judged them.

Practically all submissions were of contemporary idiom indicating a trend toward its acceptance in school design. Drawings and designs submitted were probably not entirely the thinking of architects, but also of school superintendents, school boards, administrators and others who have insisted in the past on the traditional pattern at a sacrifice of freedom and flexibility which are necessary in the development of new educational methods.

The school plan conceived twenty-five or thirty years ago represented a collection of rooms of similar size stacked one upon the other and end to end. This plan is on the way out, if it has not already expired. Decentralization is the current trend and teaching units are sized and arranged according to the function of the space.

## More Community Use

Many plans indicated the growth of the school in community living. In many instances the design, placement and arrangement of adjunct facilities to certain rooms, such as cafeterias, auditoriums, and



Mr. Hook of North Carolina received a C.E. degree from the University of North Carolina and a B.Arch. from Columbia. In 1928 he entered his father's firm and in 1946 became President-Treasurer of Walter Hook and Associates, Inc. He is President of the North Carolina State Board Architectural Examination and Registration and Chairman of the North Carolina Building Code Council and the Charlotte Zoning Board of Adjustment.

libraries indicate a definite plan to facilitate their use by more persons than students. School authorities should encourage this idea, if for no other reason than to bring the community closer to school facilities. A problem of maintenance and possible abuse of school property may arise during hours when supervision is at a minimum. Judiciously placed barricades and the proper arrangement of adjunct facilities, however, can reduce this hazard to a minimum.

The multi-purpose room is definitely a factor in school design. Combinations such as cafeteria-auditorium, English-library-seminar, auditorium-gymnasium, and others should be carefully studied for multiple functions and savings in initial construction cost.

Lighting appeared to harass most designers. Drawings indicated lighting—unilateral through quadrilateral inclusive—with the main problem centering on control.

Various schemes of light control utilizing shades, venetian blinds, glass block, ceiling louvers, were presented and some had rather dubious results. A reasonable amount of natural light, with ample quantities of properly designed and controlled artificial light, seemed the most satisfactory solution.

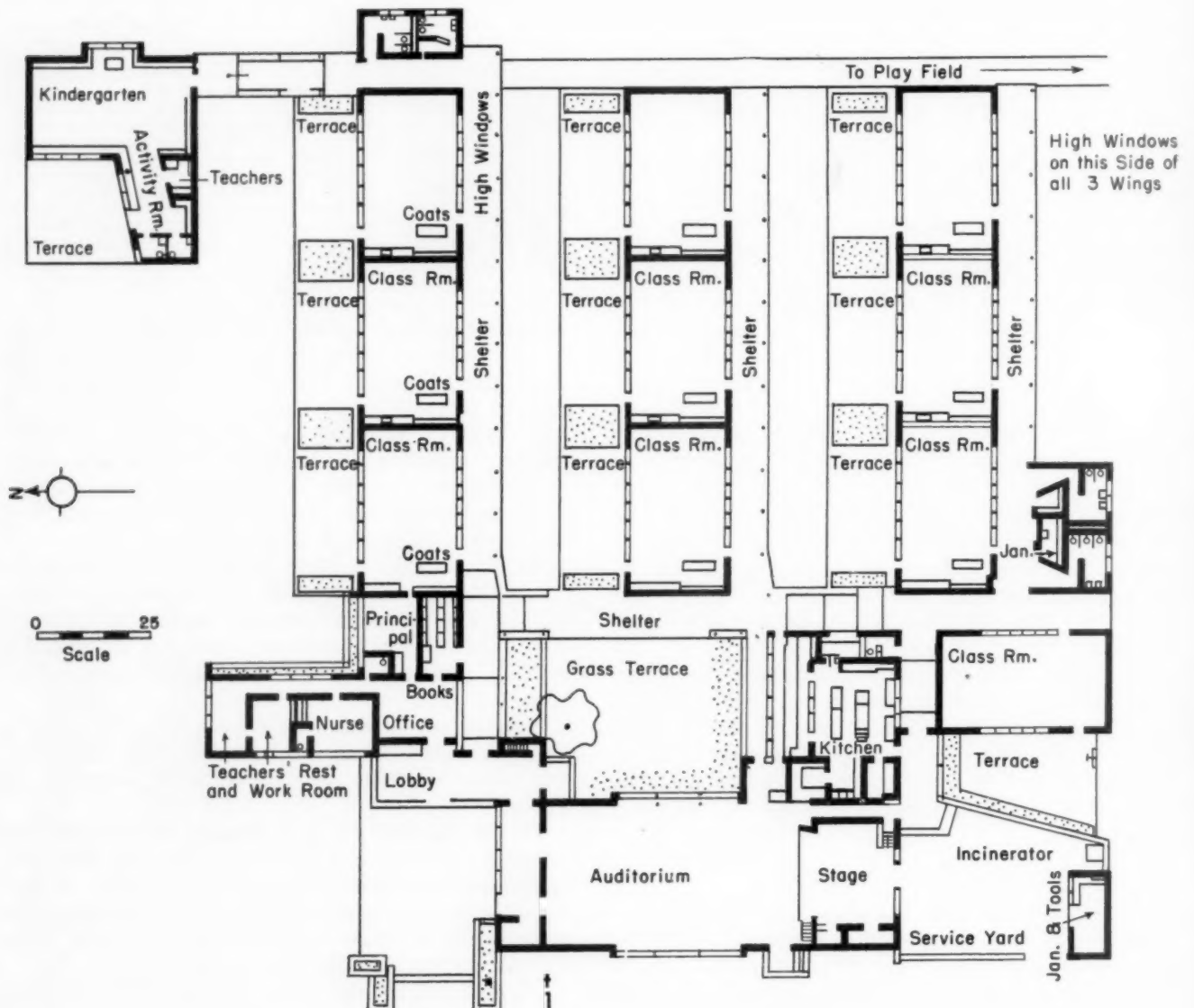
Many drawings submitted did not show the full





## FIRST HONOR AWARD

Corona Del-Mar School, California.  
Marsh, Smith and Powell, Architects





A California sea coast school with 18,000 square feet of floor area designed for 390 pupils.

extent of the school site. When the full site was shown, the areas often were inadequate or at absolute minimum.

#### Site Problem

Site acquisition, particularly in urban areas, can be perplexing to school authorities, because insufficient preliminary study is given to school site selection. School property sometimes must be acquired in densely populated areas at considerable cost and inconvenience, necessitating condemnation proceedings.

School authorities must make studies of area population trends sufficiently in advance of immediate needs so that necessary school property may be acquired before the areas are developed to a high population density.

Errors in judgment, or shift in population trends usually can be more than offset by the disposal of previously acquired property, which would definitely ease the load necessitated by the acquisition of property not previously anticipated. School authorities in growing communities should set aside each year in the school budget, if legally possible, funds to be accumulated and expended for this acquisition.

#### Award Winners

In selecting the honor awards, the jury emphasizes that the awards were based solely on the drawings submitted, and its judgment should not be construed as nationwide in scope. The jury presented first honor award to the firm of Marsh, Smith and Powell, architects, of Los Angeles, California, for the Corona Del-Mar School, Corona Del-Mar, California, with the following comments:

1. The designers utilized the advantages of open type planning without use of large site area.
2. General units grouped for public access and service.
3. Kindergarten unit semi-isolated from rest of building.
4. Classroom units sufficiently large to accommodate a modern diversified activity program, including work space with utilities, outside classroom area, and bilateral lighting.

5. Planning takes advantage of climate, but the plan is not adaptable to all climates.

6. Accessory use of the "Cafetorium," toilets adjacent to playground areas, etc., can be used separately, and at all times without necessary access to other portions of the school plant.

7. Expandibility appears to have been considered.

8. It is commendable that the designers made aesthetic use of housing mechanical equipment by placing it so it relieves the monotony of a one-story building.

In connection with the winning design, the jury questioned classroom width, control of clerestory lighting, and access to nurses' and teachers' rooms through the main office.

Awards of Merit were made to:

Atascadero Elementary School, Daniel, Mann and Johnson, architects, Atascadero, California.

Apperson Street School, Maynard Lyndon, architect, Los Angeles, California.

Rugen Elementary School, Glenview, Illinois, Perkins and Will, architects, Chicago, Illinois.

Fairfax Elementary School, John Lyon Reid, architect, Fairfax, California.

Central Elementary School, George L. Dahl, architect, Texarkana, Texas.

Wing Lake School, O'Dell, Hewlett and Luckenbach, architects, Bloomfield Hills, Michigan.

St. Rose of Lima School, Donald Barthelme, architect, Houston, Texas.

Additions to existing school plants, particularly those planned twenty-five or thirty years ago, have not been considered. They present problems which of course would have to be solved individually in each instance. As an illustration of what can be done in this phase of school design, the jury paid special commendation to the firm of O'Dell, Hewlett and Luckenbach for their sympathetic design of a contemporary one-room addition to a one-room building constructed in 1860, as a basis for future development. The use of similar materials and careful design analysis produced an extremely happy result that will appeal to those interested in modern additions to old buildings.

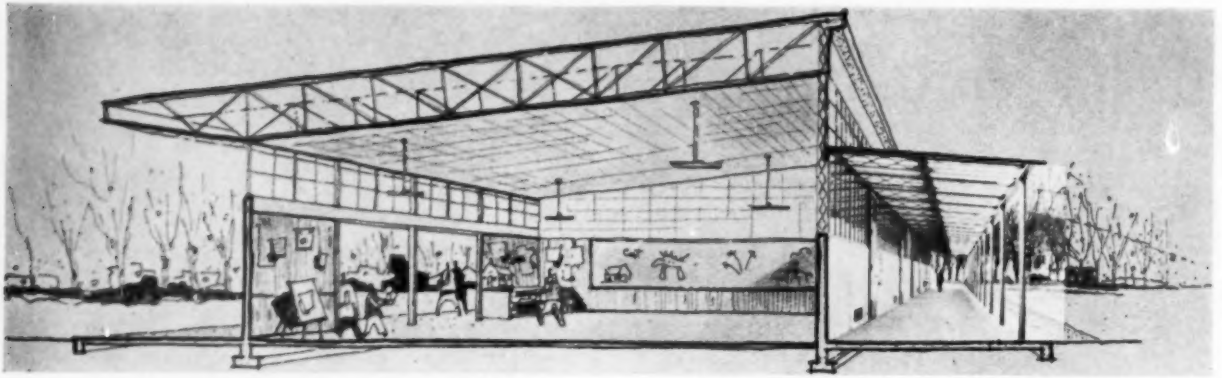




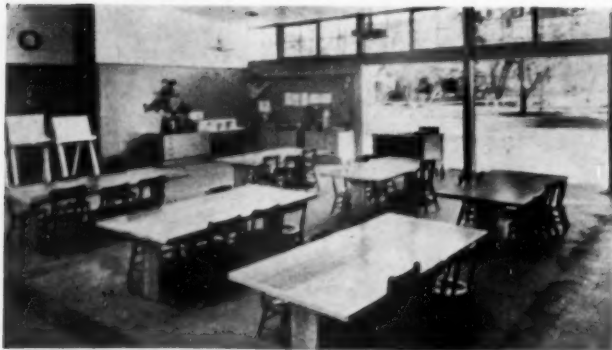
## AWARD OF MERIT

Atascadero Elementary School, Atascadero, California.

Daniel, Mann and Johnson, Architects.



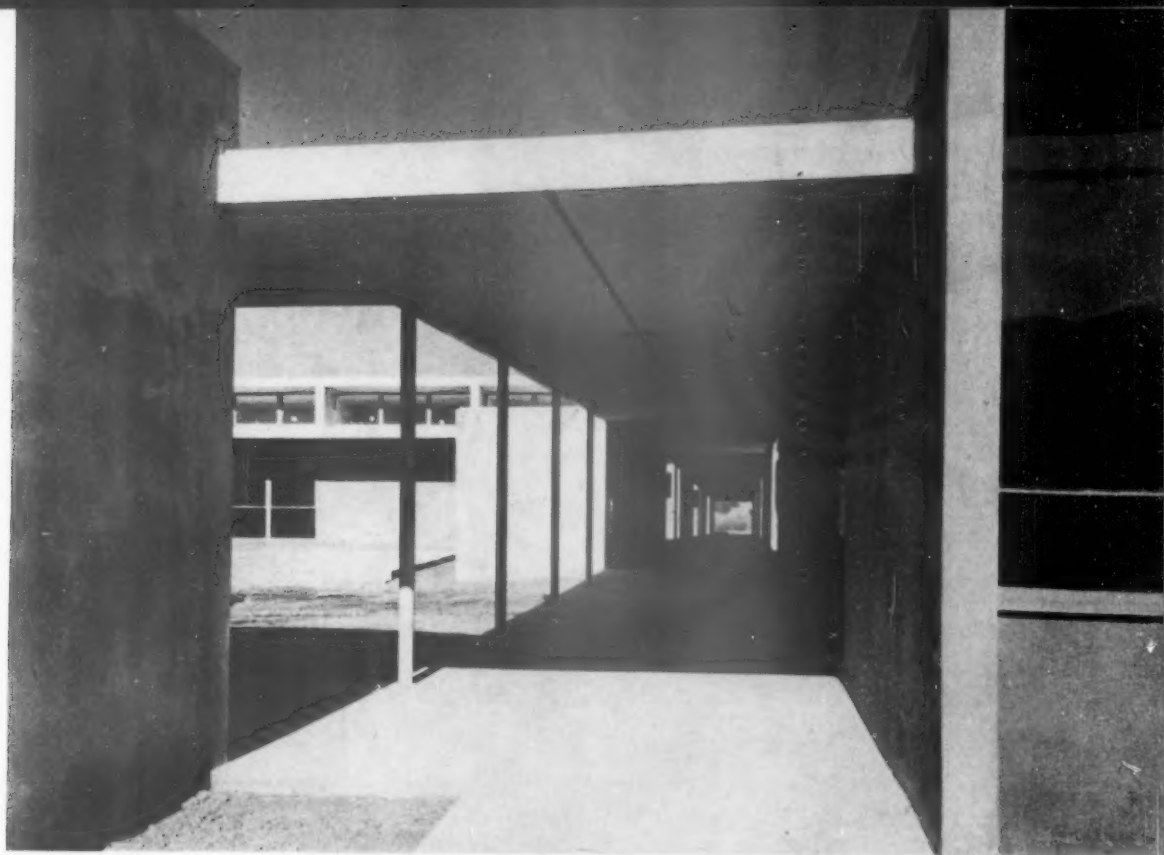
Wing No. 1, first of three to be built, has 6,025 square feet designed for 160 pupils.



Interior of classroom in Atascadero Elementary School.

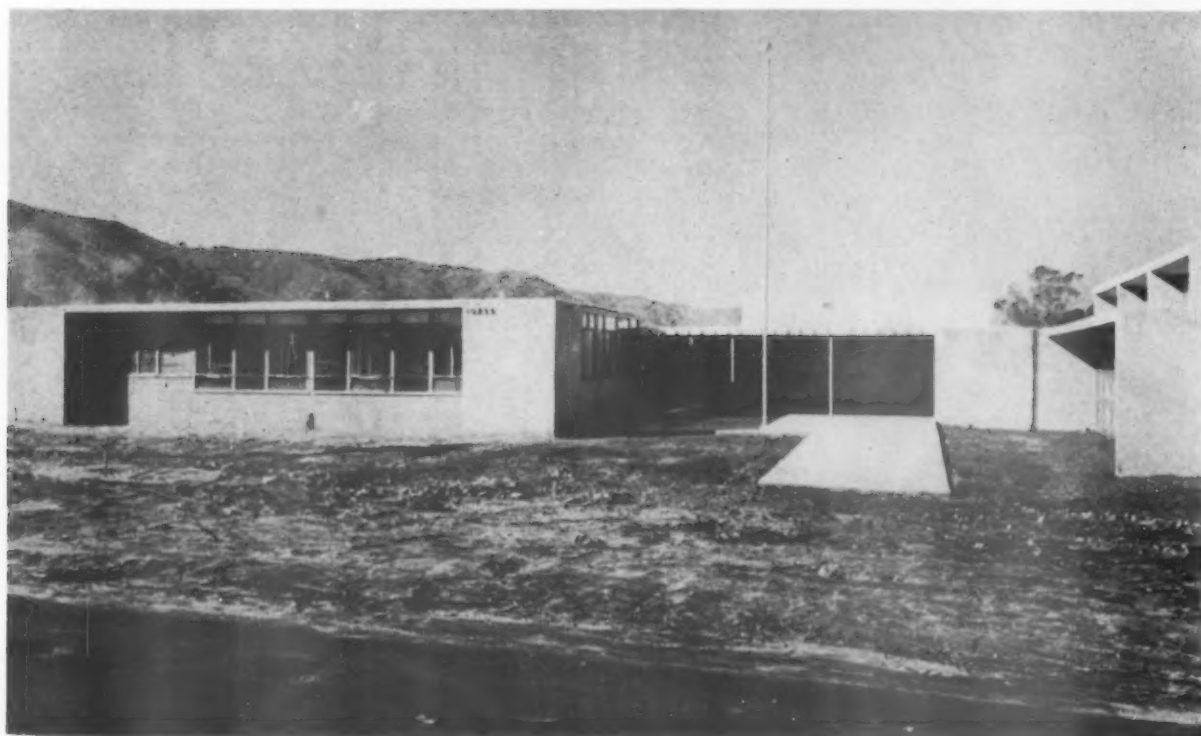


Overhang offers protection from sun for outdoor lessons.

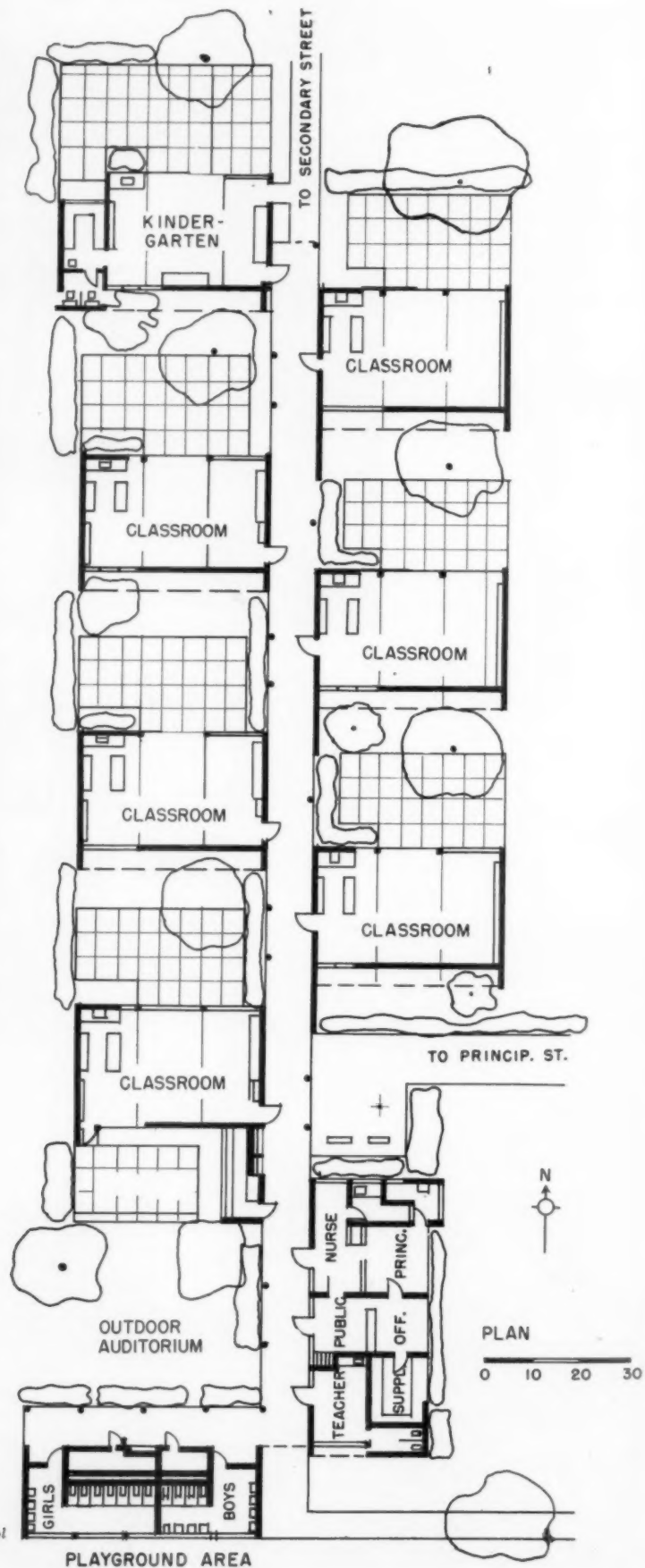


## AWARD OF MERIT

Apperson Street School, Los Angeles, California.  
Maynard Lyndon, Architect.



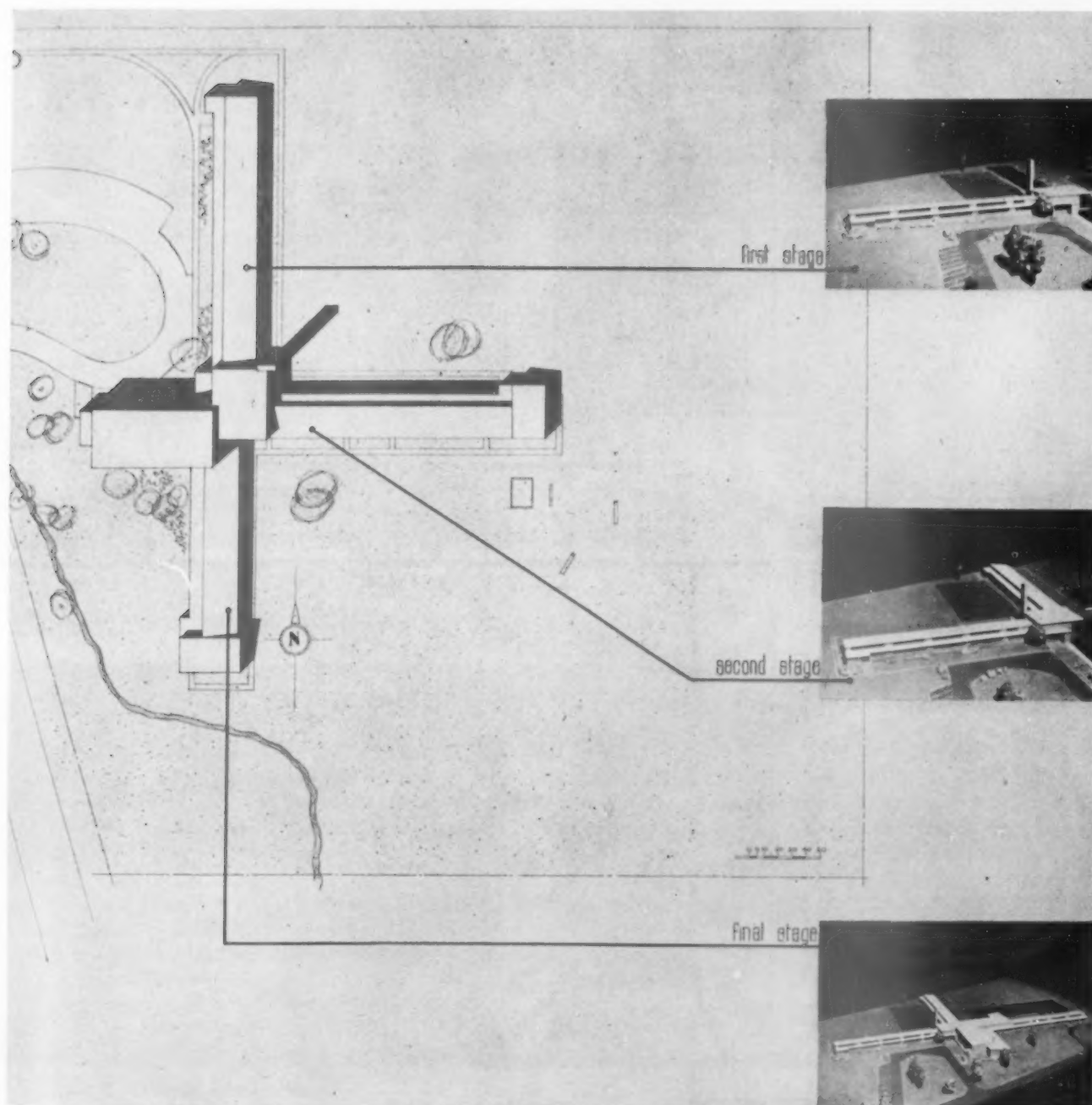




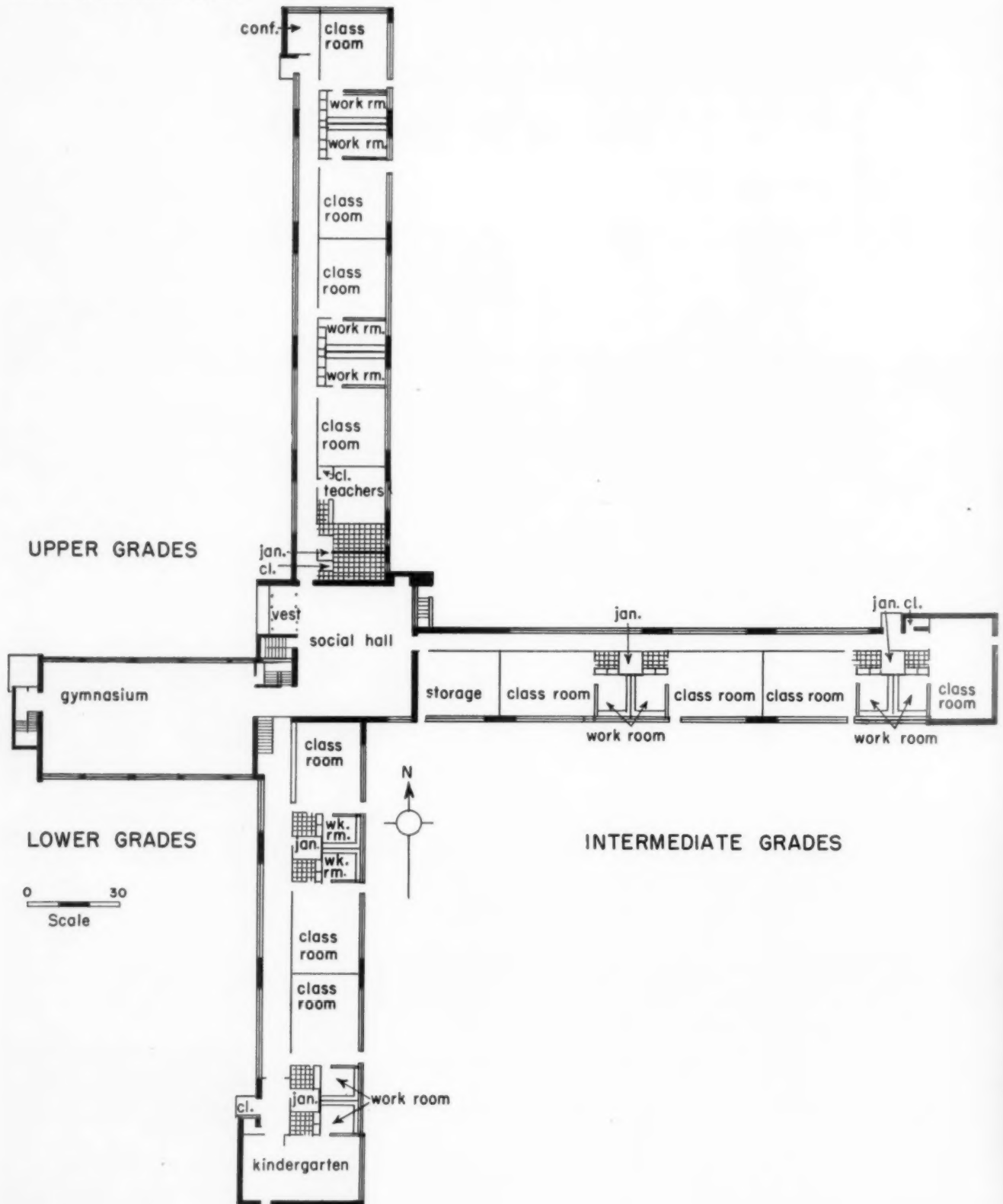
*Floor plan of Apperson Street School*

## AWARD OF MERIT

Rugen Elementary School, Glenview, Illinois.  
Perkins and Will, Architects.



Floor plan of Rugen Elementary School



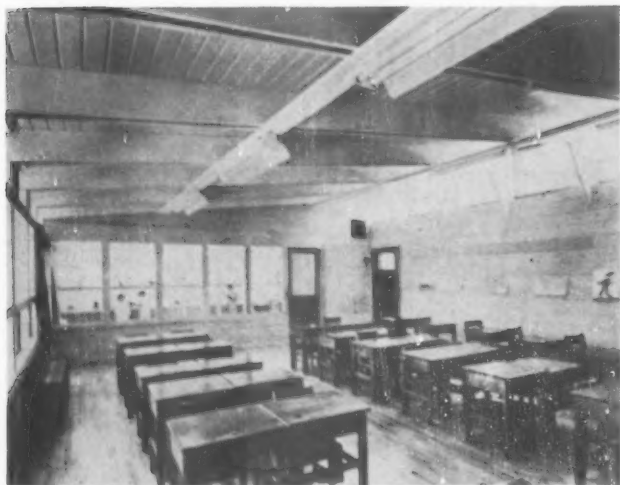




South wing showing typical fenestration



Intermediate and upper grades



Typical classroom



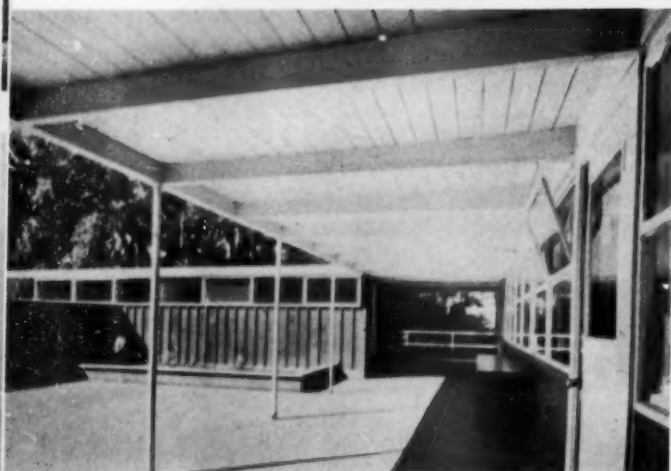
Principal entrance showing gymnasium



Opposite view of classroom



Gymnasium and primary wing



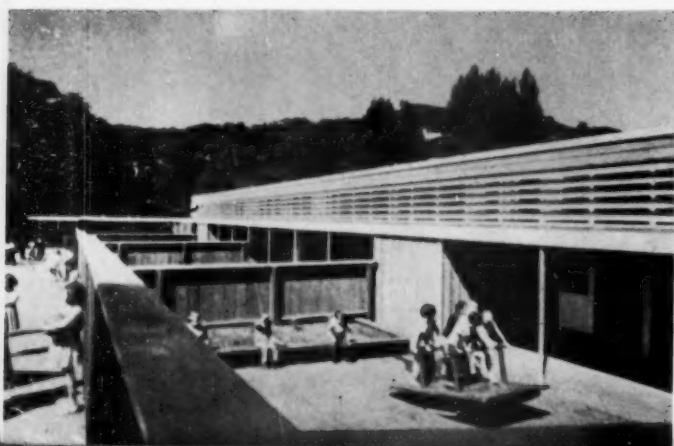
## AWARD OF MERIT

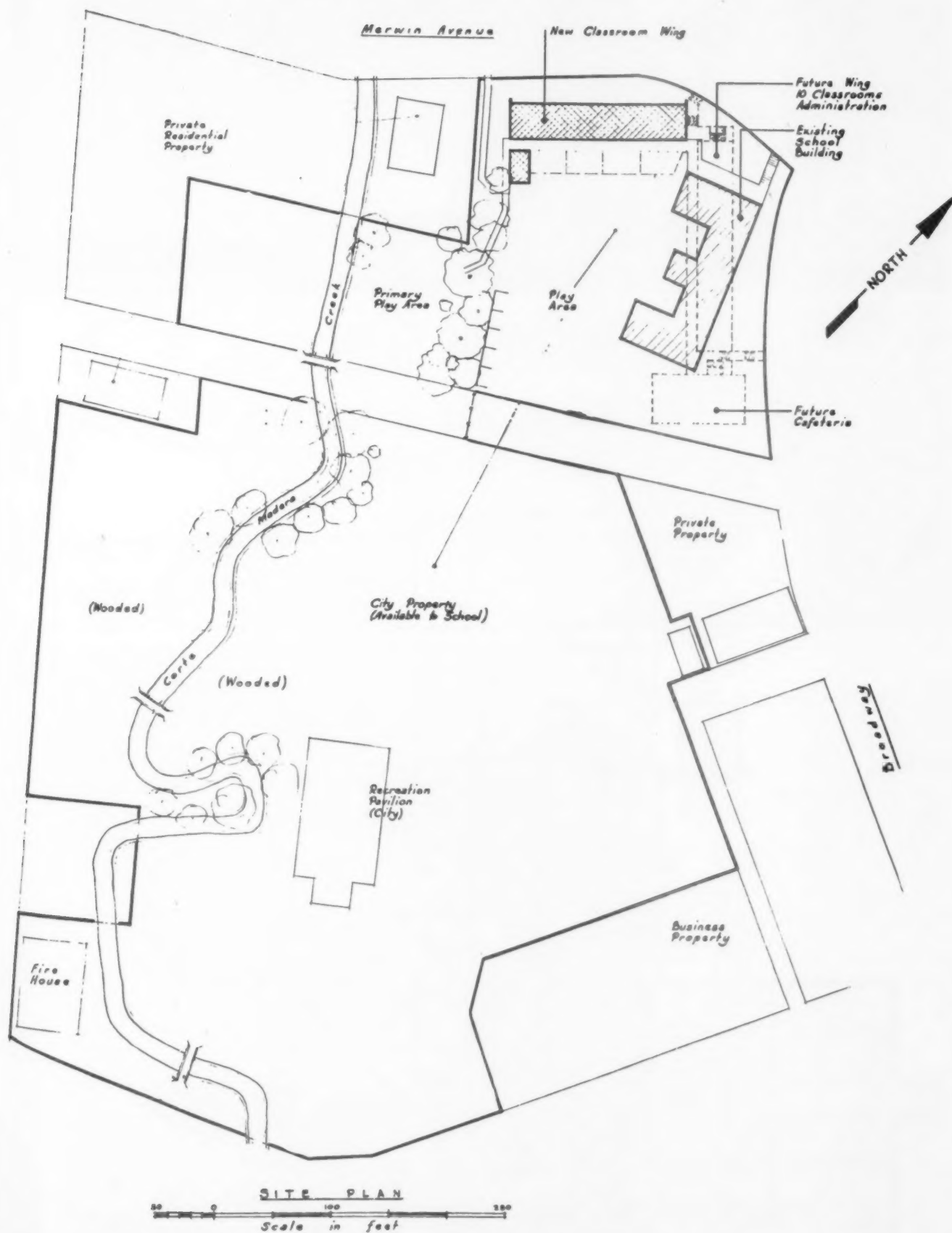
Fairfax Elementary School, Fairfax, California.

John Lyon Reid, Architect.



Each classroom in the new elementary wing is adjacent to a separate outdoor classroom.





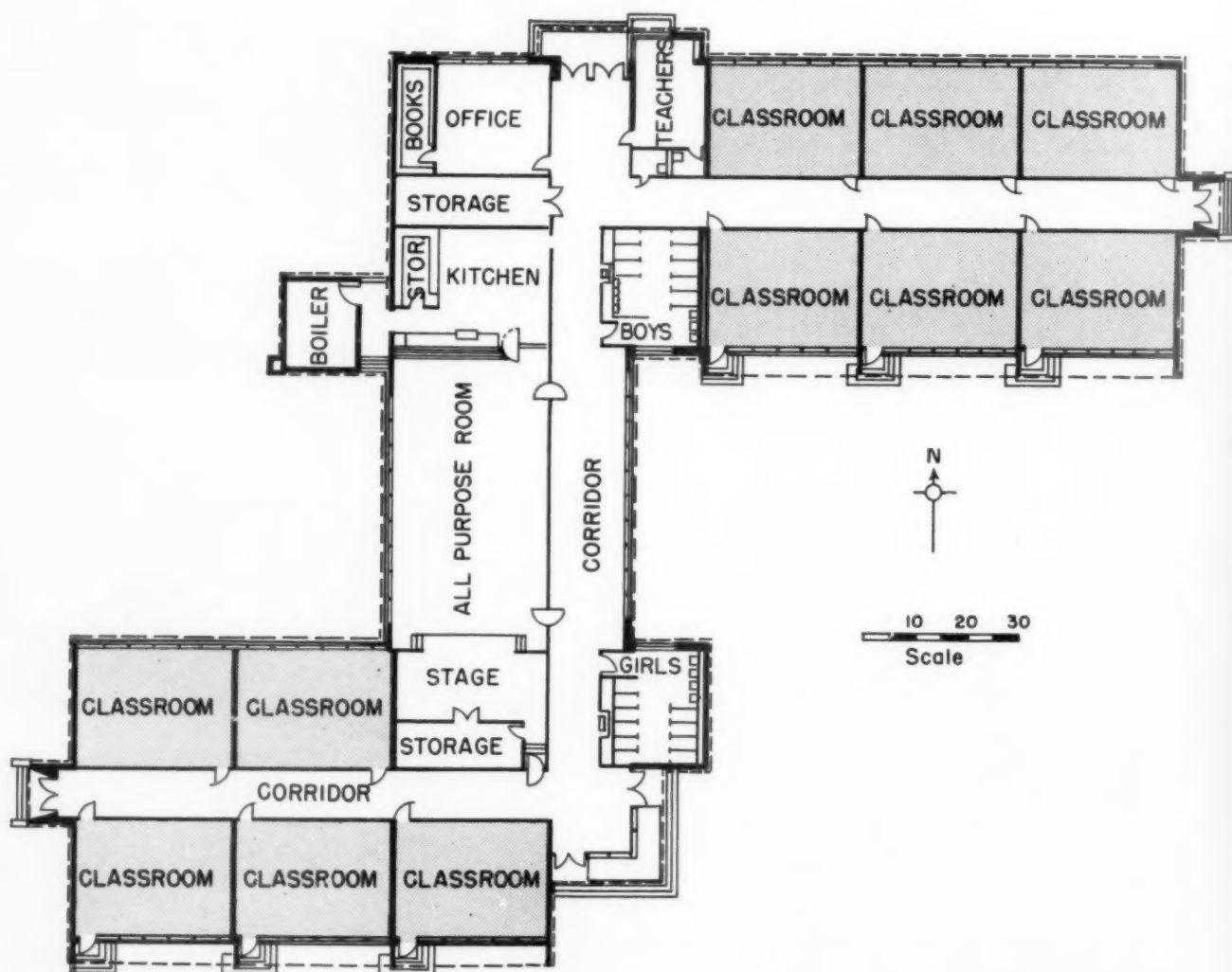




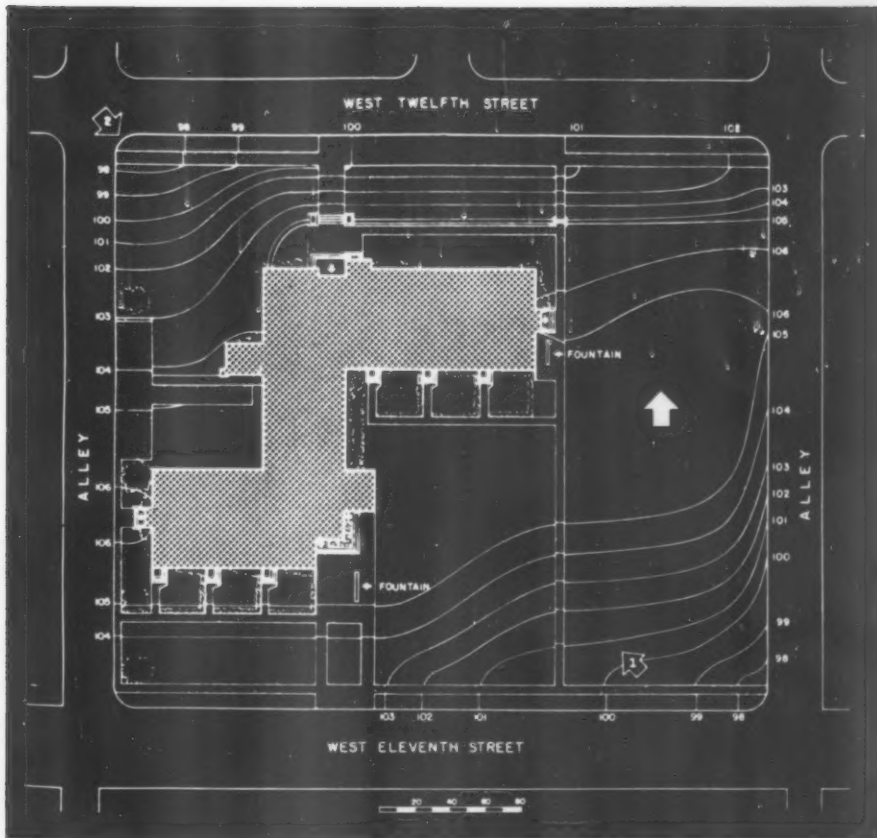
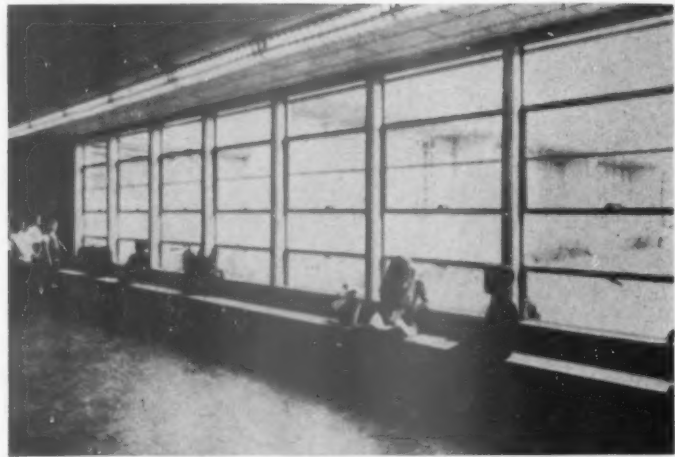
## AWARD OF MERIT

Central Elementary School, Texarkana, Texas.

Geo. H. Dahl, Architect.



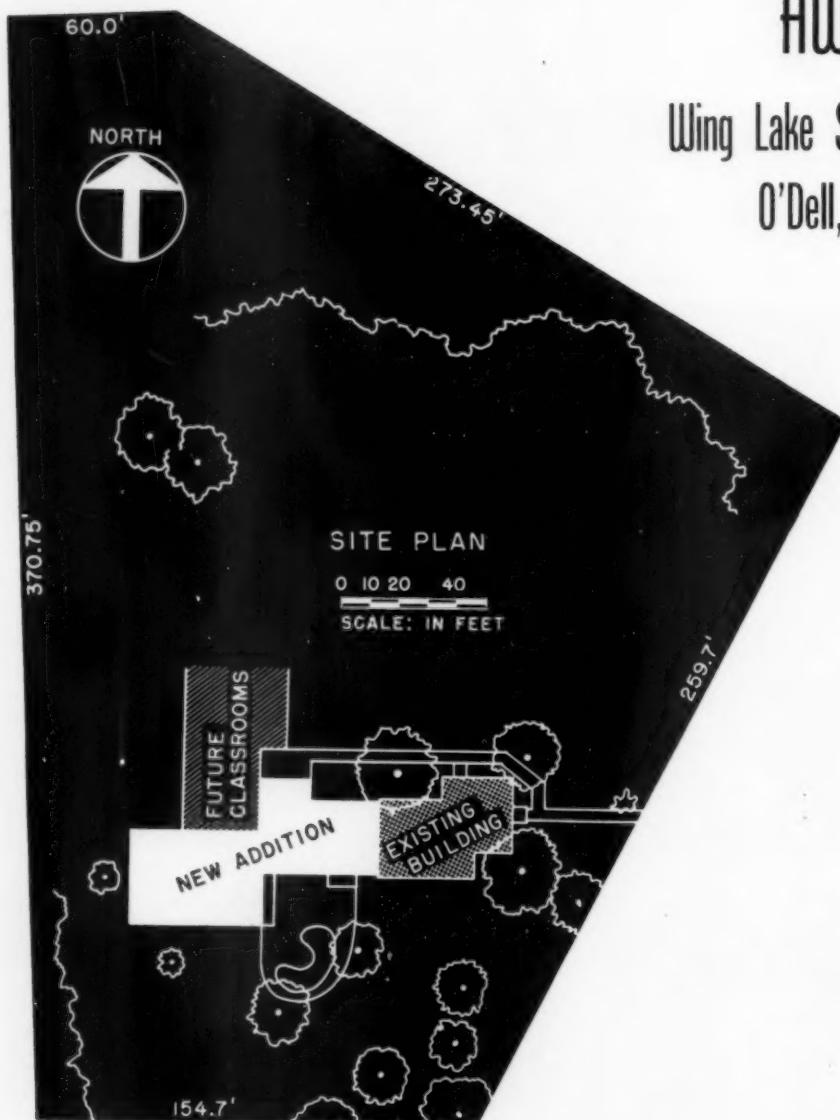
Gross area inside exterior walls is 16,500 square feet for capacity of 330 pupils





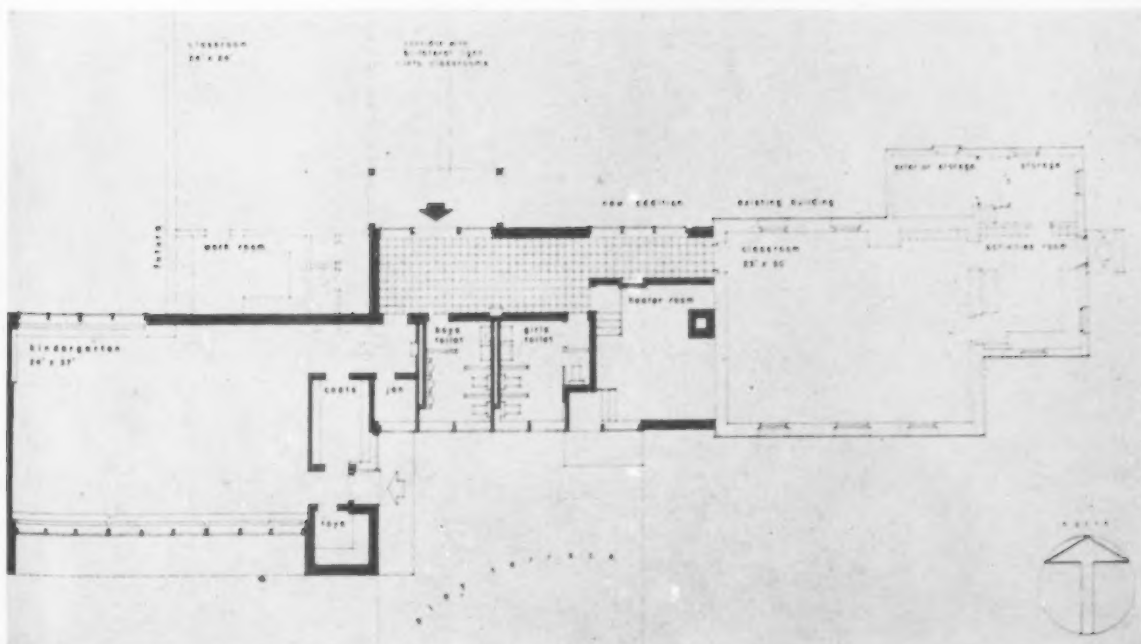
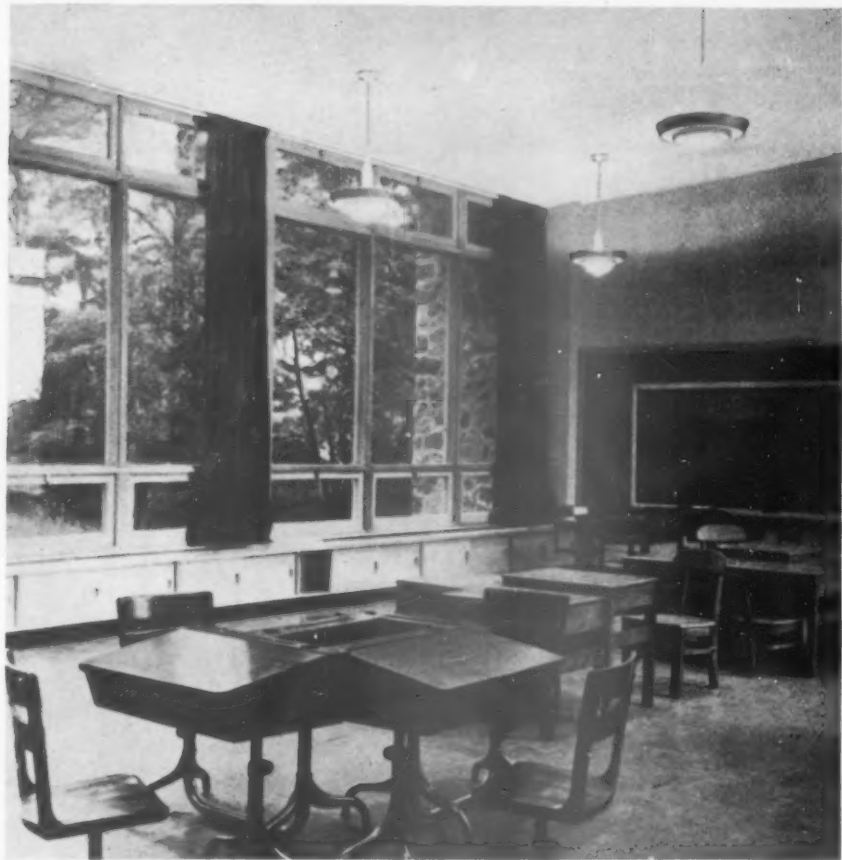
## AWARD OF MERIT

Wing Lake School, Bloomfield Hills, Michigan.  
O'Dell, Hewlett and Luckenbach,  
Architects.





Classrooms feature informality and flexibility for a diversified learning program.

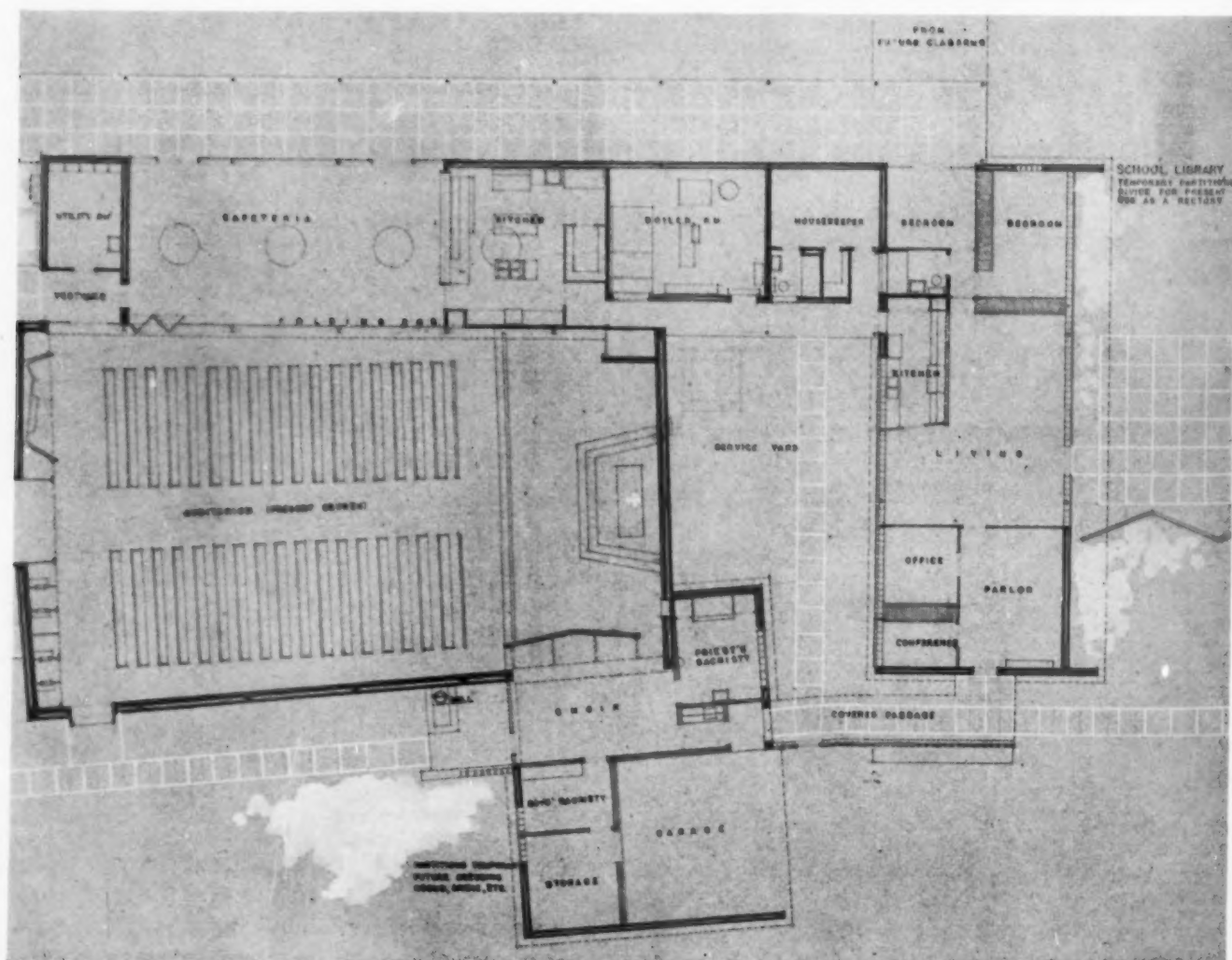




## AWARD OF MERIT

St. Rose of Lima School,  
Houston, Texas.

Donald Barthelme, Architect.



# EDUCATIONAL SPECIFICATIONS FOR NEW SCHOOL BUILDINGS

By STANTON LEGGETT

Engelhardt, Engelhardt and Leggett, Educational Consultants, New York City

HENRY BARNARD'S book on *School Architecture*, published in 1848, contains the architectural plans and specifications for many school buildings of his times. In layout, frequently the plans are on one page and on the facing page the specifications are printed in their entirety for the general construction, heating, plumbing and ventilation of the structure. In one page, the architect sets down all that at that time was thought necessary to guide the builder in the construction of the new school plant. Educational authorities and architect told the builder in essence to put up a structure that would look something like the plans. Left to the builder's discretion were many decisions properly of an architectural nature. The builder thus assumed many of the architect's characteristics, a position of responsibility for which contractors needed varying degrees of abilities.

Except in isolated cases, the relationship between educator and architect is remarkably analogous today. The architect is advised by the educational authorities, frequently on one sheet of paper, that a school building is wanted with so many classrooms, a cafeteria, auditorium and a gymnasium, and that a sum of money, usually inadequate, is available to build the building. From that point on the architect must assume the role of an educator. He endeavors to interpret the problems of education in terms of spaces on the basis of his experience in schools and with schools together with any other material on the subject that he can collect and absorb in a short period of time.

The ability of architects to understand and interpret the needs of modern education varies. As in the case of the builder of the schools in Henry Bar-



Dr. Leggett received his B.A., M.A., and Ph.D. degrees from Columbia University. He has been high school teacher, supervising principal of schools, and university professor, and is now an Educational Consultant. He is a member of several organizations, including the National Education Association and American Association of School Administrators. He is the author of several books on education.

nard's day, too much is left to chance. More significant, the truly important educational problems that require the best professional skill of the architect to solve successfully in terms of space are left undefined and, if some new school buildings can be used for examples, in many cases remain undiscovered.

## Complete Specifications Today

When well done, the specifications for a new school building prepared by the architect for the several contractors today is a considerable document. It prescribes with care the exact nature of the work to be done and the materials to be supplied. It is direct, simply stated, yet accurate, to-the-point and completely comprehensive. No longer is the type of discretion permitted that allows the builder to enter into the realm of the architect and alter the nature of the building. The architect is assured that, if the specifications and plans are followed, the building he has envisaged in words and lines will become a reality of concrete and steel, masonry and wood.

The educator who tells the architect that the school system needs a building for 500 pupils has no assurance that the teachers and pupils will get the building



they need unless educational specifications for that plant have been spelled out with equal care.

In recent years, educational specifications for new school buildings have been developed in communities either by the professional staff or by educational consultants who also assist in the development of plans. A combination of the two is preferable with frequent reference to the board of education and interested persons or groups in the community. These programs represent a pooling of thinking on education which results in a definition of the functions to be served by the building. All facets of the building are fully explored in the light of educational experience.

Based upon this clarification and expression of the educational requirements of a new school plant, the problems and issues to be resolved architecturally are placed in order and defined in simple, practical terms. The architect is free to use his professional skills in solving architectural problems with the confidence that he understands how the educators want the school to function in all its manifold aspects.

#### Complex Building Reflects Methods

The school of Henry Barnard's day was a simple building and today's schools are complex. Modern education is a complex thing dealing with human beings and not with storage case minds requiring only artful packing with knowledge. In this educational program all sections of the building have significance in the education of children and youth.

Good or bad habits can be learned in toilet rooms. Proper planning of these spaces in the light of educational need and experience will provide the environment in which the toilet rooms will make a positive contribution to the education of the student. Lessons in personal cleanliness, grooming and the like will be put into practice. Let the educator tell the architect what items of educational significance to seek in each situation and buildings more closely related to educational problems will result.

To illustrate at this point the scope and intensiveness of modern educational specifications for a school building may shed light on these points. It should be underlined, however, that each building requires its own specifications, for each educational program has its individualities and each community setting is different.

The Board of Education of San Francisco is currently undertaking a large building program. For each project an extensive statement of educational specifications has been developed by the professional staff and their educational consultants. The Program of Educational and Community Requirements for the Southeast Junior High School \* serves as an example.

\* Board of Education, San Francisco, California, Program of Educational and Community Requirements for Southeast Junior High School, Project Number 8, prepared by Engelhardt, Engelhardt and Leggett and the professional staff of the San Francisco School System, Herbert C. Clish, superintendent; the Board of Education, 1949, mimeographed, 161 pp.

The table of contents of the educational specifications of this school is reproduced below:

1. The site and its advantages
  - Character of the land
  - Some influences of the site upon planning
  - The site topographical survey
  - Map showing areas
  - Map showing proposed site
2. Educational program of the junior high school
  - Overall pattern
  - The architect's opportunity
3. The proposed enrollment
4. The number and characteristics of classrooms
  - Features of classrooms
  - Checklist for junior high school classrooms
  - The procedures within the classroom
  - General requirements of the classrooms
  - The English classrooms
  - Planning the science laboratories
  - The language rooms
  - Planning the mathematics rooms
  - Planning the social science laboratories
  - The shape and form of classrooms
5. Planning the auditorium
  - Use of the auditorium
  - Seating and general treatment
  - Auxiliary stage spaces
  - Fireproof curtains
  - Electrical equipment
  - Border lights
  - San Francisco's assembly laws
  - Exits
  - Fire protection provisions
  - Zoning for public use
6. Planning the cafeteria
  - Location
  - Teachers' lunchroom
  - Receiving area and storage area
  - Food preparation area
  - Serving area
  - Cleanup area
  - Helpers' room
  - Drinking fountains
  - Handwashing equipment
  - General suggestions
  - Details of equipment
  - Lists of equipment for various service needs
  - Provision for student service
  - Cafeteria decoration
  - Exits from the cafeteria
  - The lighting of the cafeteria
  - Cafeteria office
  - The snack bar
  - Waste containers
  - Protection against accidents
7. Planning the indoor recreation and health areas
  - Instructional program of the gymnasium
  - Auxiliary spaces
  - Instructor's office
  - Storeroom

- Community storeroom
- Locker room
- Shower rooms
- Gymnasium toilets
- Dressing and storage or box lockers
- Restrooms
- 8. The school's library
  - Scope of library service
  - Integration with community life
  - Supplementary library facilities
  - Varied school use of the library
  - Service for teachers
  - General reading room
  - Supplementary rooms
  - Essential equipment
  - Details of equipment
  - Volumes to be housed
  - Librarian's office and workroom
  - Conference rooms or alcoves
  - Natural and artificial lighting
  - Finish materials
- 9. Planning the spaces for administration
  - Administration and guidance facilities
  - Location
  - Provision for administrative services
  - The principal's office
  - Guidance facilities
  - Health and medical center
- 10. Teacher service facilities
- 11. Student service facilities
- 12. Planning the specialized classrooms
  - Instruction in commercial branches
  - Facilities for music
  - Facilities for the arts
  - Preparing students in the home arts
  - Home arts as a separate unit
  - Shop work for junior high school students
- 13. Specific suggestions for building betterment
  - Artificial lighting
  - Storage facilities
  - Storage provisions for classrooms
- 14. Custodial service facilities
  - Detailed suggestions on custodial provisions
  - Types of water closets and urinals
- 15. Building communications system
- 16. Outdoor recreational and physical education
  - Facilities
  - Other major factors in site planning
- 17. Diagrams helpful in planning
  - Classroom
  - Mathematics laboratory
  - Dramatics room
  - Social science laboratory
  - English instruction spaces
  - English room
  - Medical and health suite
  - Art classroom
  - Custodian's sink closet
- 18. Student working heights
- 19. The facilities and their areas in the Aptos and

- Marina Junior High Schools
- 20. Summary of space requirements
  - Section A Classrooms
  - Section B Auditorium
  - Section C Cafeteria
  - Section D Library
  - Section E Gymnasium
  - Section F Administrative spaces
  - Section G Teachers' spaces
  - Section H Health and medical center
  - Section I Commercial
  - Section J Music
  - Section K Art
  - Section L Homemaking
  - Section M Shop facilities
  - Section N Student service facilities

Appendix A: Checklist for the prevention and control of fire and for safeguards against fire dangers

Appendix B: Requirements for audio-visual programs for all classrooms

Only a glimpse of the intensiveness of statement of requirements is indicated. A few illustrations may prove suggestive of the type of detail that is appropriate.

With regard to the educational program, considerable space is devoted to a general statement of what the school will attempt to do for its students. Emphasized are the importance of student interest groups, clubs and student government activities together with the need for space for this type of activity. The requirement for a wide and rich variety of resources for students on this level is stated in terms of needs for spaces. Community requirements involved in public use of rooms and specialized areas in the building are noted with requirements for the organized recreational program carried on outside regular school hours.

In skeleton form, the schedule of offerings over the three years is presented so that the architect may understand better the sequence and time allotments of the various activities. Throughout the statement, the architect is directed to other existing buildings, not to see what spaces are provided, but to observe the educational program. With respect to art, he is directed to a junior high school where a superior art program has been developed. Access is provided to the architect to saturate himself with the best in educational practice that the city has to offer.

Educational specifications go beyond the existing program. An attempt is made to predict some of the educational changes that may be anticipated so that the building, while meeting present needs, may also be easily adapted to future needs.

#### Important Little Things

At the other end of the scale from discussion of the educational program may be found many details of planning that are of great importance in the everyday

operation of a school. Take doors as an illustration. In San Francisco, junior high schools are departmentalized and students change classes each period. After discussion with the staff, it was agreed that two doors should be required for every instructional room and the architect is so informed. Doors should be recessed so that they do not open into the corridor. Doors should open with the flow of traffic toward the nearest exit. The type of door with regard to glass section and ability to close off light or view from the corridor is discussed. The door hardware should be designed to allow the door to be opened from the inside at any time. Door checks are discussed from the aspects of need, maintenance and operation problems, and cost.

Doors are treated in connection with the assembly spaces. Reference is made to codes controlling the means of exit from such spaces. Where it has been found desirable to have doors of fire-resistive materials, the architect has been advised.

Exterior doors are discussed in connection with maintenance and operation problems, the requirements for panic bolts and the necessity of preventing unauthorized entrance. At the same time, complete freedom from barriers to exit must be preserved.

#### Variations on One Idea

Considerable space is devoted to classroom design. A careful analysis of the activities that take place in classrooms has been included as well as a detailed checklist on classroom design. Within the group of eight English classrooms, the following variations have been suggested based upon careful study by professional staff and educational consultants:

- 2 English classrooms with simple platform stages
- 1 Speech classroom
- 1 Journalism room with adjacent office and mimeo-

graph room for student publications

4 English classrooms with special emphasis on displays and book and magazine racks

Each type of English classroom is treated in detail describing how the rooms will be used for all types of language arts work. Some of these rooms can be planned for specialized use as well. For example, the speech room can serve as a "regular classroom" yet be available for specialized speech use. Recording and playback equipment require special consideration of acoustics. Uses of a versatile school communication system and availability of the FM radio station for the school system as a whole are increasing. The speech room should be designed as an originating point for broadcasts to a few classrooms in the building, the entire building or for broadcasts over the school system radio station and at times over commercial stations.

#### Design for Vital Program

To as great a degree as possible, the needs of the school organization are defined in terms that have space implication to the architect. The experience gained over the years by all members of the staff and by the educational consultants in the maintenance and operation of school programs is distilled and brought together for the guidance of the architect. By preparing a comprehensive statement of educational specifications, assurance is given that no aspect of planning will be overlooked.

In this fashion the educator is assured that, if the architect has studied the points raised and solved the problems posed, a school building will result that corresponds to the functioning building for which he has asked. A complete statement of educational specifications is essential to the design of a building to house a vital educational program.



# CONSIDERATIONS FOR BUILDING SCHOOLS

By JAMES A. VAN ZWOLL

Professor of Educational Administration, University of Maryland, College Park

ALL KINDS of solutions have been proposed to solve the biggest problem confronting schoolmen today: more and better school buildings.

Some people maintain that we should just sweat out the situation. Increase class sizes; use part-time sessions; make classrooms out of gymnasiums, cafeterias, and auditoriums; put up temporary partitions. By these and other expedients, the problem will bring about its own solution.

Others, convinced of the need for school buildings, approach the problem in exactly the same manner as they would have twenty or thirty years ago. Sites are selected and buildings built with utter disregard for the tools of research and planning which have been developed during the past two and a half decades.

A third group confronts the problem with a full recognition of the importance of economy and the need for planning. The chief difficulty in this group grows out of differing points of view regarding the importance of education and the implications of certain types of construction for safety's sake.

## Permanent vs. Other Type Construction

The question is whether good permanent-type structures can be planned so that they will serve in optimum fashion and be economical in the long run.

Those who hold that economy, permanency, and continuity of optimum use cannot all be attained under conditions of change in the American society advocate temporary buildings. In their search for a satisfactory solution, they turn to either the building of structures for use during a limited period of time



Dr. Van Zwoll was educated in Michigan, receiving a B.A. at Calvin College and M.A. and Ph.D. degrees at University of Michigan. He progressed from high school teacher to assistant superintendent of schools until World War II. After serving in the Navy, he became a lecturer in school administration at the University of Michigan and then assistant professor at the University of Iowa. He is now a professor at the University of Maryland.

or structures which are movable in units and demountable for reconstruction elsewhere.

Temporary movable or demountable structures are often less expensive than permanent ones because of lighter construction materials. These materials are generally incorporated into a one-story structure which has an inherently high safety factor. However, those who have seen heavy beams of structural steel twisted like baling wire after a fire in a *fireproof* building may think twice before going all out for light construction.

Similarly, those who have building problems in congested urban areas where really adequate school sites are practically impossible to secure may find it necessary to settle for a structure more than one story in height. Multi-story construction increases the fire hazard and necessitates offsetting precautions with structural materials and methods of construction.

Permanent type buildings which are structurally sound but not filled to capacity provide a good argument for proponents of less permanent construction. If the inefficiency of these partially used buildings

has evolved in spite of a carefully developed plan, there is some merit in the criticism.

However, sound planning can take into consideration factors which blight some areas and promote growth in others. School buildings planned as to location and design in terms of the developmental factors of the specific school district need not become ghost schools with facilities for which there is no local demand.

In specific local situations there may be instances in which some temporary construction may be used to carry a particular locale through a problem that will be eliminated by normal developments within the foreseeable future.

#### Depreciated Buildings

There is another aspect to the situation. Why are buildings built during the 1800's still allowed to strait-jacket education? Why are the *temporaries* of the early post-World War I period still doing duty thirty years later? Both kinds of structures not only have served their purposes but they have provided instructional space facilities at an extremely low per capita cost. Applications of practical depreciation formulas would show such buildings to be completely depreciated and their abandonment to be wholly warranted. No real argument exists on the point of economy in the retention of these structurally obsolete buildings.

Yet the low cost and depreciation aspects of school buildings are not commonly shown to the people. These factors should be brought to their attention positively and continuously so that the people them-

selves will be anticipating the obsolescence and abandonment of school buildings. This calls for a program to interpret both community and school needs.

#### Financing School Buildings

Another major consideration is the financing of school buildings. Interpretation can bring about willingness to pay for new school buildings on an adequate scale, but no amount of interpretation can increase the ability of people to meet building costs. The means still used so extensively to finance school building construction today is as outmoded as many school buildings still in use.

Greatest concern should not be for decreasing the permanence of buildings but rather for increasing soundness of planning, for providing continuous interpretation of the status and adequacy of school plant, and for revamping finances rather completely. The financial burden should be equally divided according to the abilities of the districts in which building takes place.

#### Recommended Readings

1. U. S. Office of Education, *Statistics of State School Systems, 1919-1944*. Washington: U. S. Government Printing Office. 1922-1946.
2. Our Poor Schools, *Kiplinger Magazine*. 2:9 September 1948. Pp. 5-11.
3. Arthur B. Moehlman, *Public School Plant Program*. New York: Rand McNally and Company. 1929. pp. 194 and 197.
4. William W. Wurster, Architecture Broadens Its Base, *Journal of the American Institute of Architects*. July 1948.
5. *Architectural Forum*. Vol. 91, No. 4. October 1949.

# SCHOOL PLANT SURVEYS IN GEORGIA

By PENDLETON MITCHELL

Director of Surveys, State Department of Education, Atlanta, Georgia

**E**DUCATIONAL PLANNING on the local level in Georgia was given a tremendous impetus in middle 1940's through the leadership of the education panel of the State Agricultural and Industrial Development Board. This was later developed into the Bureau of Educational Research and Field Studies, College of Education, University of Georgia, under the direction of the present dean, O. C. Aderhold. The bureau has continued stimulating local community planning through the county or systemwide comprehensive surveys which it undertakes, attempting at least one major study each year. Besides cooperative planning of large groups of white people, extensive group study by Negroes also was organized. Local cooperative planning is being continued on a large scale, since the completion of the survey in 1949.

One major concern in the Richmond County-Augusta survey was the determination of school plant needs with a reorganization of school program and attendance areas. While this survey was in progress other counties and independent city systems were seeking assistance in school plant surveys. Many requested assistance from the State Superintendent of Schools. The State Department of Education to meet some demands developed techniques and procedures.

By February 1950 about twenty school plant surveys were under way, all at the request of local system boards and under the general supervision of the State Department of Education. Several surveys involved the county school system and one or more independent systems attempting cooperatively to attack their common problems.

## Who Started It

Their initiation sometimes may be traced directly to leadership of system superintendents. In some cases members of the board of education stimulated the request. The people themselves in a few counties were articulate enough to exert pressure upon the administration to seek assistance in making a study. In a few situations groups of Negro school patrons and citizens presented petitions demanding equalization of facilities and of educational opportunities.



Mr. Mitchell was born in Georgia and educated at the University of Tennessee, Emory University, and George Peabody College. He has taught in public schools and at the University of Georgia but was also a journalist and still contributes to professional periodicals. He also worked in the Georgia State Department of Education as a State School Supervisor, School Plant Planning. At present he is the Director of Surveys and Field Services.

Organizing for the school plant survey has varied. While a general pattern of techniques and procedures is emerging, no plan should be too rigid for ample adjustment to local problems and peculiarities. In every survey a "central" or "steering" committee has been created with a chairman and a secretary. Subcommittees deal with specific problems of collecting, tabulating and analyzing data. Each sub-committee has its chairman and secretary. Where two or more systems were involved committees included vice-chairmen. Usually the steering committee has been appointed by boards of education acting through their superintendents. In some instances a large group appointed by the board has met and organized several committees. Their officers became the steering committee. In every case efforts have been made to secure wide lay participation from every community in the country. In most instances where leaders were appointed they were named as temporary officers with the total group having the opportunity to confirm their selection or to replace them with others.

Forming sub-committees was considered one of the most important steps in the total procedure. Four blocks of general information were suggested for convenience:

1. The school program in its implication for the school plant.
2. Personnel, particularly regarding school population, trends and numbers by age and grade levels and by schools, location of residence of pupils, etc.
3. Evaluation of existing school plant facilities.
4. Problems of finance, administration, transportation and organization as related to the school plant.



The four corresponding sub-committees are the program committee, population committee, present school plant evaluation committee, and finance and administration committee. In several instances only the first three were organized within Negro groups with the understanding that information secured in the fourth area would be made available. From the beginning of the organization for each survey between 50 and 150 people were concerned. Indications were that many hundreds would be touched by survey activity before its completion.

#### State Officials Help

The State Department of Education has made available the assistance of a director of surveys and field services to organize and direct surveys. Area state school supervisors, nine in Georgia, have been instrumental in setting up surveys and in most cases will serve as consultants to committees on population. Personnel in the State Department of Education, colleges throughout the state and in some county systems have been drawn upon for consultant service to the program committees. The Supervisor of Curriculum Development in the State Department of Education helped secure this personnel by requesting the aid of individuals who had previously accepted assignments as consultants in planning for transition to the twelve-year program. The Director of Surveys, with principals and other schoolpeople who have had some training and experience in school plant planning, advised school plant evaluation committees. The director of the division of Negro education in the State Department has assumed some general responsibilities as counselor to the committees in different situations.

The State Fire Marshal has agreed to cooperate in appraising all school plants to determine their provisions for safety and will see that recommendations for needed changes or corrections are made. Recent legislation has stimulated activities in providing safe buildings and corrections recommended as a result of inspections will be mandatory upon the local board.

State and county health departments have agreed to assist in appraising school plants for healthful living. The State Department of Public Health is supplying at cost large county maps to be used in spotting the school population, existing schools and proposed centers, and transportation routes. In many counties of Georgia, health engineers and sanitarians have recently completed studies of the schools. Reports of these studies will be available to the school plant survey committee. Where such health surveys have not been made recently they will be scheduled concurrently with the school plant survey.

#### Growing Problem

While the acuteness of the immediate problems and the grave inadequacy of the majority of school plants have stimulated activities in surveys and schoolhouse construction, there is also a growing concern among schoolpeople and laymen to secure something better

in the school program and facilities to house that program. Survey procedure in at least two counties has already proved effective. Bond elections for school building construction were recently voted upon favorably by the people in situations where the difficult problem of small high school attendance area reorganization was involved.

Even with the activity that is now in progress only slightly more than 10 per cent of the school systems are directly effected. An equal number of systems have filed official requests for assistance in making a survey, but no definite date has been set for their initiation. The recent issuance of *Guide for Local System School Plant Survey* by the State Department of Education was designed to facilitate procedure by giving committees some guidance and suggestions for their work. With the production of this guide, the increasing interest and participation of professional leaders, and the possibility of some expansion in the survey staff of the Department of Education, school plant survey activity in Georgia will be accelerated within the year.

#### Surveying on the Local Level

Certain restrictions of functions and principles of relationships apply in surveying at the local level:

1. The planning group exercises only an advisory function, and its conclusions may be recorded and reported as recommendations.
2. Members of the planning group must recognize the advisory character and also the proper function of the individual as a member of the group, willing and able to accept "rules and regulations" adopted or implied in the nature of group thinking and action.
3. The administrative authority, system board of education and superintendent, must in good faith give consideration to recommendations of survey committees, but must also retain the consciousness of its own obligation and responsibility to make the final decisions regarding activation of the program.
4. In projecting statements of school plant needs, the survey group cannot undertake the task of determining many technical matters related to architectural and engineering details. The detailed planning of specific school plants cannot be accomplished within the scope of the survey. The pattern of local cooperative action as developed in the survey, however, may well be extended into the later steps of planning and developing the action program of a school plant.

#### Need for a Survey

One of the explanations for the critical inadequacy of the school building in Georgia is the absence of careful and intelligent planning.<sup>1</sup> Another, inevitably, is the historical lack of adequate financing. In the face of almost certain continued limitations in resources to finance capital outlay, the survey to de-

<sup>1</sup> *A Study of School Buildings in Georgia*, Education Panel, Agriculture and Industrial Development Board, P. 57.

termine actual needs is more important than ever if intelligent school plant planning is to be secured.

As a tool to facilitate better educational programs, the school plant must be efficiently located in relation to the number and age-levels of children to be served, and must be so developed that it will fit the specific program needed at that location. Conditions peculiar to a given community may lead to the identification of other needs for a survey.

#### Purposes of a Survey

The major purposes of the school plant survey include the determination of:

1. The kind of school plants required to house effectively the educational program specifically planned to meet the needs of the communities served by the school. (This will provide the "terms" in which present facilities may be evaluated and future school plants may be planned.)
2. The number of school plants needed to serve effectively all communities and individuals included in the system.
3. The desirable location of each school or school center.
4. The desirable size of each school, whether elementary or high school or combination, and the number of pupil-stations and teacher-stations required.
5. The optimum possible utilization of existing facilities as they may or may not be found appropriate for continued use in the total program.
6. Recommendations including a step-by-step program, possibly requiring a number of years to complete, to provide needed facilities with individual projects listed in the order of urgency and importance in the total scheme.
7. Possible requirements in terms of dollars needed to provide facilities in an immediate program and a long-range program.

Other purposes which should be recognized include the development of local understanding and support of the school program, and the creation of another opportunity for democratic processes to operate on the local level.

#### Initiating and Planning the Survey

Several methods of making school plant surveys have been used by county and city systems in Georgia. Out-of-the-state consultants or agencies in cooperation with state and local school officials have directed a few, such as those in Tifton and Tift county, Polk and Cobb counties, Chatham county. In the latter case, as in Richmond, Clark and Baldwin counties which were directed by the Bureau of Educational Research and Field Studies of the University of Georgia, the school plant problems were treated as a part of a comprehensive educational survey. Some systems have conducted their own studies.

When the assistance of the State Department of Education is desired, the following steps are suggested.

1. Transmittal of system board request to the Di-

rector of Surveys and Field Services, State Department of Education, for assistance in making a survey to determine school plant needs and to develop a program to meet those needs.

2. Conferences between local and state personnel to organize and plan the survey. Techniques of forming local committees as described in the *School Leaders Manual* are recommended for consideration in setting up the survey group.<sup>2</sup>

3. Creation of a "steering" committee and subcommittees to carry out the survey procedures.

4. Arranging for the use, in the work of the committee and individuals, of resources in the form of consultative personnel, written material, records, etc.

5. Provision for the preparation of a written report of the conclusions and recommendations of the survey group after all facts have been gathered and analyzed.

The information usually found desirable may be conveniently classified into four areas, suggesting the formation of four "sub-committees." These four areas form the outline for the following sections.

1. Kind of school program desired and its implications for the school plant.

2. Population study: Population and enrollment trends, distribution of school population by grade levels, geographical distribution of school population and of existing schools (as shown on spot maps and in tables), etc.

3. Evaluation of existing facilities in terms of educational fitness and other requirements.

4. Administration, organization and finance information relating to the provision of school plants and financing of capital outlay.

#### The School Program and the Plant

Continuous planning and appraisal of the school program and its effectiveness in the local communities make it possible to draw forth those facts and conclusions which have direct implications for the school plant. Particularly a wealth of pertinent material should be amassed in each system on plans for transition from an eleven- to a twelve-year school program. In any case, it is not recommended that a comprehensive curriculum study be attempted within the scope of the school plant survey.

For background, a statement of the philosophy and objectives of the school and a summary appraisal of the extent to which the present program is consistent with the statement are needed. In terms of stated objectives, tabulations may be made of the content of the present program. On the elementary level a table showing the amount of time within the school day devoted to such phases of the program as health education, social living, basic skills, manual arts, music, etc., should be easily developed. The schedule of high school activities, including the formerly so-called "extracurricular," is perhaps more easily developed.

<sup>2</sup> Aderhold, O. C. and others: *School Leaders Manual*, Education Panel, Agriculture and Industrial Development Board, Athens, Georgia, 1947.







Use larger circle (quarter-size) to show proposed new center. Draw lines with arrows from each present school to the center or centers where its pupils will be relocated.

The material gathered in this study of the school personnel should be used in the determination of the location, type, and size of proposed permanent school centers.

When the evidence is analyzed, a small map may be used to show the location and type of existing schools, and by means of a large symbol the location of the proposed school center. Lines may be drawn from the symbols indicating present schools to the proposed school center with arrows showing the direction of movement.

#### The Present School Plants

The first aim in evaluation is to help. Directing attention to inadequacies is not criticism of individuals or groups, but should be considered a procedure of assembling factual information. Recognizing the desirable characteristics of a school plant is of equal importance as a guide to determine the possibilities of extended use. Both as a measure of economy and as a wise educational procedure, those facilities which are serviceable, or can be made so at reasonable cost, for a modern school program should be continued in use even if funds are available for replacement. Many buildings which are sound structurally, however, may be educationally obsolescent. Only through detailed study and the application of sound criteria can it be determined at just what point a building should be rehabilitated or abandoned. The development and application of such criteria will, in the final analysis, be determined by decisions made by local administrative authorities.

Teachers, pupils and principals should participate in the study of the school plant. Following are forms suggested for use in recording school plant data. The first form can be completed by pupils and teachers and will give valuable information regarding classrooms. (The latter part of these forms will reveal facts which should be of value to the group studying the school program.) The School Plant Check Sheet should be completed by the principal with the assistance of others as needed, and will give further information regarding the entire school plant.

#### Classroom Data Sheet for Teachers

Name of School \_\_\_\_\_ Name of Teacher \_\_\_\_\_ Date \_\_\_\_\_  
Number Enrolled Today (If more than one grade, give number in each) \_\_\_\_\_

Kind of Seating \_\_\_\_\_ No. of Pupil Stations \_\_\_\_\_  
Location of Room: (Circle one) Basement, Semi-basement, 1st floor, 2nd floor, 3rd floor  
Size of Room: Width \_\_\_\_\_ Length \_\_\_\_\_ Ceiling height \_\_\_\_\_  
Total square footage \_\_\_\_\_ Square feet per pupil enrolled \_\_\_\_\_  
Number of windows: East \_\_\_\_\_ West \_\_\_\_\_  
North \_\_\_\_\_ South \_\_\_\_\_

Distance from windows: To floor \_\_\_\_\_ to ceiling \_\_\_\_\_  
to room ends \_\_\_\_\_  
No. Square feet of glass area: \_\_\_\_\_  
Artificial Light Fixtures: Kind \_\_\_\_\_ No. \_\_\_\_\_  
Distance from Floor \_\_\_\_\_  
Linear Feet: Bookshelves \_\_\_\_\_ Blackboard \_\_\_\_\_  
Bulletin Board \_\_\_\_\_  
Other Features: (Circle if present) Electric wall outlets, Cloak storage, Supply closets, Shades.  
General condition of room (kind of floor and floor covering; color or finish of ceilings, walls, floors and furniture; condition of equipment; etc.): \_\_\_\_\_

Comments: (Use reverse side if needed and indicate what things are needed to improve learning situation.)  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

#### SCHOOL PLANT CHECK SHEET\*

(To be completed by Principal and staff)

School System \_\_\_\_\_ Name of School \_\_\_\_\_ Date Built \_\_\_\_\_  
Race \_\_\_\_\_ Grades Taught \_\_\_\_\_ No. of Teachers \_\_\_\_\_  
Enrollment \_\_\_\_\_ Date \_\_\_\_\_ Check by \_\_\_\_\_  
(Insert words which will best answer question: *Yes* or *no* where only presence is indicated, adequacy in kind, number, or development, as indicated.)  
SITE: No. of acres \_\_\_\_\_ Developed play areas \_\_\_\_\_  
Driveways \_\_\_\_\_ Parking areas \_\_\_\_\_  
BUILDING: Frame \_\_\_\_\_ Masonry \_\_\_\_\_ or \_\_\_\_\_  
No. of stories \_\_\_\_\_ Well located on site \_\_\_\_\_  
SPACE AREAS: No. of Classrooms \_\_\_\_\_ (use classroom data sheet for detailed information)  
Music: Piano \_\_\_\_\_ Band \_\_\_\_\_ Acoustics \_\_\_\_\_  
Science Laboratories: Kinds \_\_\_\_\_  
Type of Equipment \_\_\_\_\_ Storage \_\_\_\_\_  
Home Making: Clothing \_\_\_\_\_ Foods \_\_\_\_\_ Other \_\_\_\_\_  
Type of Equipment \_\_\_\_\_  
Shops: Kind \_\_\_\_\_ Location \_\_\_\_\_ Equipment \_\_\_\_\_  
Auditorium: No. seats \_\_\_\_\_ Exits \_\_\_\_\_ Size stage \_\_\_\_\_  
Library: Size \_\_\_\_\_ Seats \_\_\_\_\_ Location \_\_\_\_\_  
Linear feet shelving \_\_\_\_\_ Workrooms \_\_\_\_\_ Records \_\_\_\_\_  
Gymnasium: Size \_\_\_\_\_ Location \_\_\_\_\_ Shower facilities \_\_\_\_\_  
Locker facilities \_\_\_\_\_  
Physical education and other equipment \_\_\_\_\_  
Offices: Size \_\_\_\_\_ Location \_\_\_\_\_ Fireproof storage \_\_\_\_\_  
Lunchroom: Dining area size \_\_\_\_\_ Equipment \_\_\_\_\_  
Kitchen size \_\_\_\_\_ Equipment \_\_\_\_\_ Sanitation \_\_\_\_\_  
Storage rooms: Number, location, size, use, etc. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Instructional Equipment: Visual aids \_\_\_\_\_ Bulletin boards \_\_\_\_\_  
Projectors \_\_\_\_\_ Maps \_\_\_\_\_ Record Players \_\_\_\_\_  
Duplicators \_\_\_\_\_ Others \_\_\_\_\_  
Lighting: Fixtures per classroom \_\_\_\_\_ Type \_\_\_\_\_  
Height above floor \_\_\_\_\_  
Type, color, condition of window shades or shields \_\_\_\_\_

\* Adopted from *The School Plant* forms used by Peabody College, Division of Surveys and Field Services, and other score sheets.

# SCHOOL PLANT SURVEYS IN GEORGIA

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Services: Heating Method \_\_\_\_\_ Ventilation \_\_\_\_\_  
 Lighting \_\_\_\_\_  
 Toilets: Type \_\_\_\_\_ Number \_\_\_\_\_ Location \_\_\_\_\_  
 No. Fixtures: Girls: Water closets \_\_\_\_\_  
 Boys: Water closets \_\_\_\_\_  
 Urinals \_\_\_\_\_ No. Lavatories \_\_\_\_\_ Sanitary condition \_\_\_\_\_

Water Supply: Source \_\_\_\_\_ Fountains \_\_\_\_\_ Sanitation \_\_\_\_\_  
 Janitorial Supplies: Quality \_\_\_\_\_ Storage \_\_\_\_\_ Use \_\_\_\_\_  
 First Aid Supplies: Location \_\_\_\_\_ Adequacy \_\_\_\_\_  
 Fire Extinguishers: Location \_\_\_\_\_ Adequacy \_\_\_\_\_  
 Traffic Hazards \_\_\_\_\_ Storage under stairs \_\_\_\_\_  
 Boiler room condition \_\_\_\_\_ Exits \_\_\_\_\_

## Check Improvements Needed:

	Area	Capacity	Decoration	Equipment	Flexibility	Lighting	Location	Safety	Seating	Storing
1. Auditorium										
2. Classrooms										
3. Clinic										
4. Gym										
5. Library										
6. Lunchroom										
7. Music—Art										
8. Offices										
9. Restrooms										
10. Workrooms:										
Agriculture										
Business										
Home Economics										
Industrial										
Science										

## Needed Repairs: Indicate what is needed in blank after each item.

### Grounds:

Drain \_\_\_\_\_  
 Grade \_\_\_\_\_  
 Planting \_\_\_\_\_  
 Walks \_\_\_\_\_

### Masonry:

Foundations \_\_\_\_\_  
 Pointing \_\_\_\_\_  
 Plastering \_\_\_\_\_

### Roof:

Repair leaks \_\_\_\_\_  
 New roof \_\_\_\_\_

### Carpentry:

Doors \_\_\_\_\_  
 Windows \_\_\_\_\_  
 Floors \_\_\_\_\_  
 Blackboards \_\_\_\_\_  
 Weatherboarding \_\_\_\_\_  
 Out houses \_\_\_\_\_

### Painting needed:

Outside \_\_\_\_\_  
 Interior \_\_\_\_\_  
 Blackboards \_\_\_\_\_

### Equipment:

Window shades \_\_\_\_\_  
 Seats and desks \_\_\_\_\_

### Plumbing:

Toilet bowls \_\_\_\_\_  
 Urinals \_\_\_\_\_  
 Wash basins \_\_\_\_\_  
 Drinking fountains \_\_\_\_\_

### Electric Equipment:

\_\_\_\_\_

### Heating Equipment:

\_\_\_\_\_



The assistance of local and/or state agencies should be secured in two important phases of school plant evaluation. The office of the state fire marshal should be requested to assist in getting a factual and detailed inspection of each building to determine the adequacy of provisions for safety to life. Laws are in effect regarding the safety provisions in school buildings and there is an obligation on the part of the local administration to comply with regulations aside from the moral obligation to see that every building is safe. Local health offices already have survey reports, or

will make them, on all school plants. These reports on the provisions for healthful living should be included, or condensed for use, in the final survey report on needs. The report from the fire safety study should also be included.

Following the collection of information as suggested in the procedures just described, an appraisal should be made by a school plant specialist or consultant who has had some training and experience in school plant evaluation of an objective nature. The following rating sheet may be used by the consultant.

#### EVALUATION FORM

(Check Square in Appropriate Column)

(To be attached to classroom and school plant data sheets as compiled by teachers, principals, etc.)

Name of School \_\_\_\_\_ Name of Building \_\_\_\_\_

ITEM	Excellent	Good	Fair	Poor	Very Bad
1. SITE: Location, environment					
2. Size					
3. Condition					
4. BUILDING: Exterior structure					
5. Internal Structure and finish					
6. Heating and ventilation					
7. Fire Protection; exits; alarms					
8. Electric lights, fixtures, outlets					
9. Water supply and facilities					
10. Toilets, adequacy and sanitation					
11. CLASSROOMS: Size, shape, location					
12. Window: location, size, shades					
13. Seats and teaching equipment					
14. Closets, lockers, storage					
15. Bulletin and Chalkboards					
16. SPECIAL: Library					
17. Cafeteria					
18. Laboratories and Shops					
19. Assembly and playrooms					
20. Office, clinic, rest and workrooms					
Sub-Total					
Weighting (Multiply sub-total)					
Point Scores					

Total Score for Building \_\_\_\_\_

Tabulations may be made to show the number of buildings classified by total scores. Interpretations of total scores for buildings may be made as follows.

- 85 — 100 points = Excellent
- 70 — 84 points = Good
- 55 — 69 points = Fair
- 40 — 54 points = Poor
- Less than 40 points = Unsatisfactory

Further tabulations may be made to show prevailing weaknesses in the school plants. Narrative descriptions of each school plant should be included, in order to:

1. Summarize the evaluation of that plant and supplement statistical data where needed.

2. Indicate recommendations for disposition of the plant, such as abandonment, replacement in time, rehabilitation, depending upon facts brought out in other phases of the survey. Also indicate possible costs of repairs or remodeling, etc., if such should be considered.

Problems in administration, finance, transportation and organization should be studied for their direct influence upon the school plant program. As in the matter of curriculum study, it is not contemplated that exhaustive studies can or should be made within the scope of the school plant survey. There are factors in each of these areas, however, that are inherently part of the plant problem.

#### Administration

In the administration of a school plant program a clear policy should be established regarding the placement of responsibilities. The board of education and superintendent should have specifically defined responsibilities. Relationships between and among the superintendent and board, principals, teachers, non-teaching members of the staff, pupils, lay people and in later stages the architect and contractor should be so clearly defined in the statement of policy that confusion and misunderstanding will be avoided.

Particularly in situations where the school plant program may involve two or more separate administrative units, such as the independent system and the system of the county in which the city is located there is great need for definite understandings, not only of respective responsibilities, but also for agreed upon methods and procedures for meeting those responsibilities.

The organization and the policies of the administration, then, should be studied and those conditions or facts relating to school plant problems developed as a part of the survey report.

#### Finance

Historically, school buildings in Georgia have been financed almost wholly with funds derived from local district bond issues. Now that the county unit, or the independent city system unit, comprises the *district*, present financing is secured through countywide or

city bonds. The main facts to be considered in the experience of the local system include:

1. History of school plant financing in the county or city.

2. Statement of the nature and amounts of all outstanding indebtedness for capital outlay, including dates and amounts at maturity.

Immediately available and possible sources of revenue for capital outlay should be explored. It is necessary to know:

1. Tax digest upon which taxation for bond retirement is based.

2. Maximum amount of bonds available under existing laws.

3. Limitations in the policy of assessments, legal limits in force, possibilities of changing or removing limits.

4. Other possible sources: state equalization funds; local taxation—city or county; sale of properties; other local sources; possible federal aid.

#### Transportation

The major consideration within the school plant survey as it regards transportation should deal with the location and condition of existing roads used as transportation routes and with plans for the improvement of such roads and the construction of new roads. One of the large county maps should be used to show all bus routes and the location of existing schools and proposed new locations.

#### Organization

A simple table should be used showing the present organization of the schools:

Name of School	No. of Teachers	Grades Taught	Enrollment

The best future organization should be determined by the kind of school program desired and by the need for securing the best utilization of existing school plants—at least on a temporary basis. If the school program is planned and so operated that a sequence of activities and opportunities exists for experiences from grade one through twelve the actual organization becomes of less significance. There should be, however, a plan for the development of some definite scheme, such as K-6-3-3, 6-6, 7-5, 8-4.

#### Formulating Recommendations, Writing the Report

Arriving at sound conclusions demands thoughtful deliberation and discussion if the entire survey is to lead to better planning for improved school plant facilities. Reports of the committees dealing with the

program, the population, present facilities, administration and finance, etc., should be brought together and considered by the total survey group or by a committee.

This "reviewing" group should find in the reports the answers to such questions as: What is the school program to be and what does it imply for school plant needs? How many people are to be served, what are their ages and grade levels, and where do they live? What is the educational value of existing school plants and how may they fit into the ultimate plan? What is the administrative organization as it relates to school plant problems? What are the sources and amounts of funds which may be secured for capital outlay expenditures?

Before reaching final conclusions the group should give attention to generally accepted principles regarding such matters as the reorganization of attendance areas, the criteria which should be used to determine the proper disposition of existing school plants, etc.

The recommendations as finally drawn should indicate:

1. The location at which a school center should be maintained.

2. The type of school, elementary, secondary or combination at each center, with indication of the kind of school program in its implication for the school plant.

3. The number of people to be served at each center.

4. The proper utilization of existing facilities, if any, at the established school center.

5. The order in which listed needs should be met—based upon urgency of need to relieve congestion, provide facilities where none has existed, or to replace facilities unfit for use.

6. Estimated possible cost for establishing the school center including repairs, remodeling, and rehabilitation of old buildings, new construction, and the acquisition and development of school sites.

In effect, then, the "recommendations" should say to the superintendent and board and to all those concerned: *in order to provide the needed school program, located to serve most effectively and efficiently in organized attendance areas, and using to best advantage the existing school plant facilities that the following school centers are recommended.* School centers should be listed in the order of urgency, giving for each the following detailed information:

1. Elementary, or secondary, or combination. (Give number of grades to be taught.)

2. Location and recommended size of school site. (May be *general location* rather than specific as to actual site selection.)

3. Boundaries of attendance area—or description of area to be served.

4. Number of pupils to be enrolled, number of teachers, etc.

5. Number of teacher-stations and number of pupil-stations required.

6. Proposed use (if any) of existing facilities, in-

volving what changes or improvements, and for what length of time such use is contemplated.

7. Cost of rehabilitating existing facilities, including repairs, remodeling, modernizing, etc.

8. Cost of new construction.

School plant problems most likely will fall into classes of immediate and long-range implications. The listing of needs should show priority for immediate needs. In moving toward the ultimate pattern, intermediate steps may be necessary. Three major factors may influence the progress of the plant development and should be recognized at the time of projecting needs:

1. Limitations in financing the program. (What funds, if any, other than from local bonds, may be anticipated?)

2. Trends and mobility of school population. Predictions of future enrollments are valuable even though not to be considered as accurate forecasts.

3. Changes in the school program. (As better ways of meeting recognized needs of individuals, the program may be revised.)

Recommendations, as written for final presentation to the board, should be stated clearly and fully. The need for preparing a written report is imperative.

Those facts which constitute the "supporting evidence" upon which conclusions and recommendations are based should be recorded. The procedures used by the committees in giving consideration to collected data should be described. Tables, charts and maps which reveal the statistical data should be preserved. Both as a means of reporting the results of the survey activities (indicating immediate steps to be taken) and as a reference for long-range future planning, the written record is indispensable. This report should include:

*Introduction*—Historical background of school buildings in county. Background of survey, how it started, purposes, etc.

*School Program*—Statement of the community's philosophy of education, description of the program needed for this community and the implications for the school plant.

*Population*—Who is to be served and where do they live.

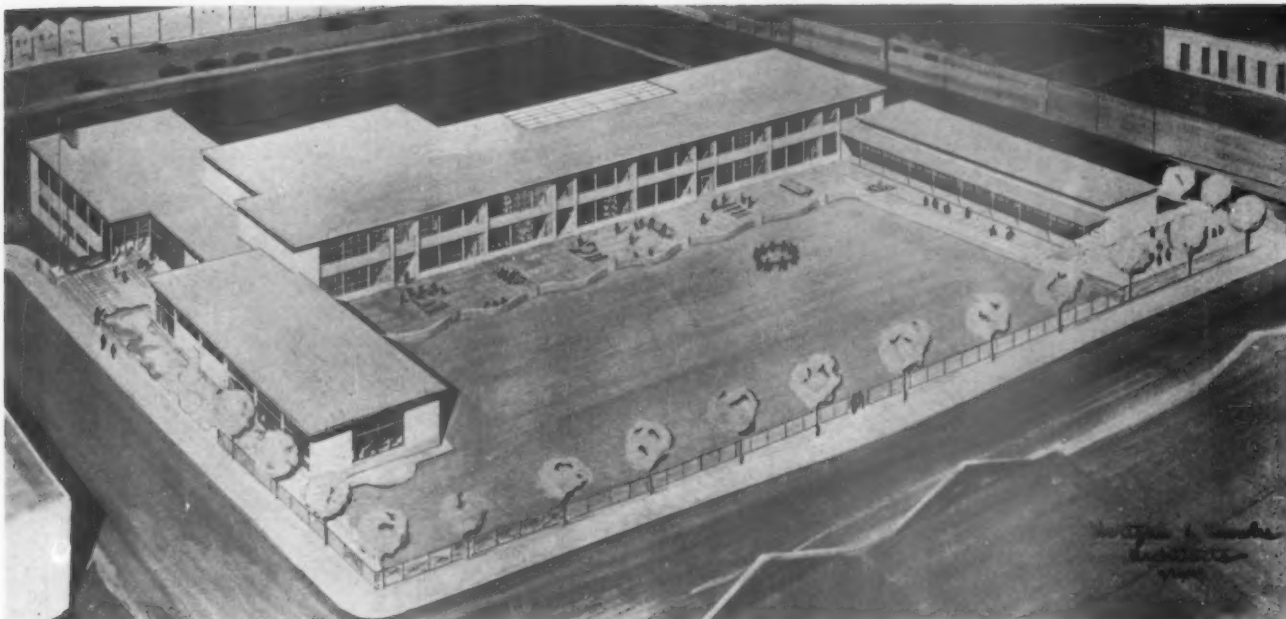
*Present Facilities*—Disposition.

*Administration, Finance, Transportation, Organization*—As affecting school plants.

*Conclusions and Recommendations*—Showing what kind of school plants should be provided, of what size, where located, etc.

Provision should be made for the assignment of tasks in preparing and editing the final report. The chairman and secretary of each sub-committee may be responsible for seeing to it that committee reports are written; the survey chairman and secretary, with the aid of the administration and the consultants, should assume responsibility for getting the final report prepared and edited. Publishing or mimeographing the report for wide distribution is recommended.





A model of Fremont Elementary School, one result of the survey described below. Hertzka and Knowles, Architects.

## ENGINEERING SURVEYS FOR SCHOOL SITES

By ROBERT J. STOFFER

Assistant Superintendent of Schools, San Francisco, California

SAN FRANCISCO, like many other communities, increased tremendously in population during and after the war years. Our schools were overcrowded and we had to have new school planning. The 1948 Engelhardt School Building Survey resulted in recommendations for new schools. Subsequently, school bonds were voted to provide them. Under the direction of Herbert C. Clish, Superintendent of Schools, a five-year program was established, including the following work:

1. Additions to present elementary schools and construction of new elementary schools and home school units involving 26 schools .....	\$22,550,000
2. Additions to and construction of four junior high schools .....	9,000,000
3. Additions to two senior high schools .....	3,250,000
4. Additions to the city college .....	2,500,000
5. Vocational educational units .....	1,750,000
6. School service warehouse building .....	1,500,000
7. Rehabilitation and modernization of existing schools .....	5,000,000
8. Equipment .....	3,140,000

The San Francisco Board of Education, advised by its school consultant, Nicholas L. Engelhardt, selected sites for the new schools and then requested



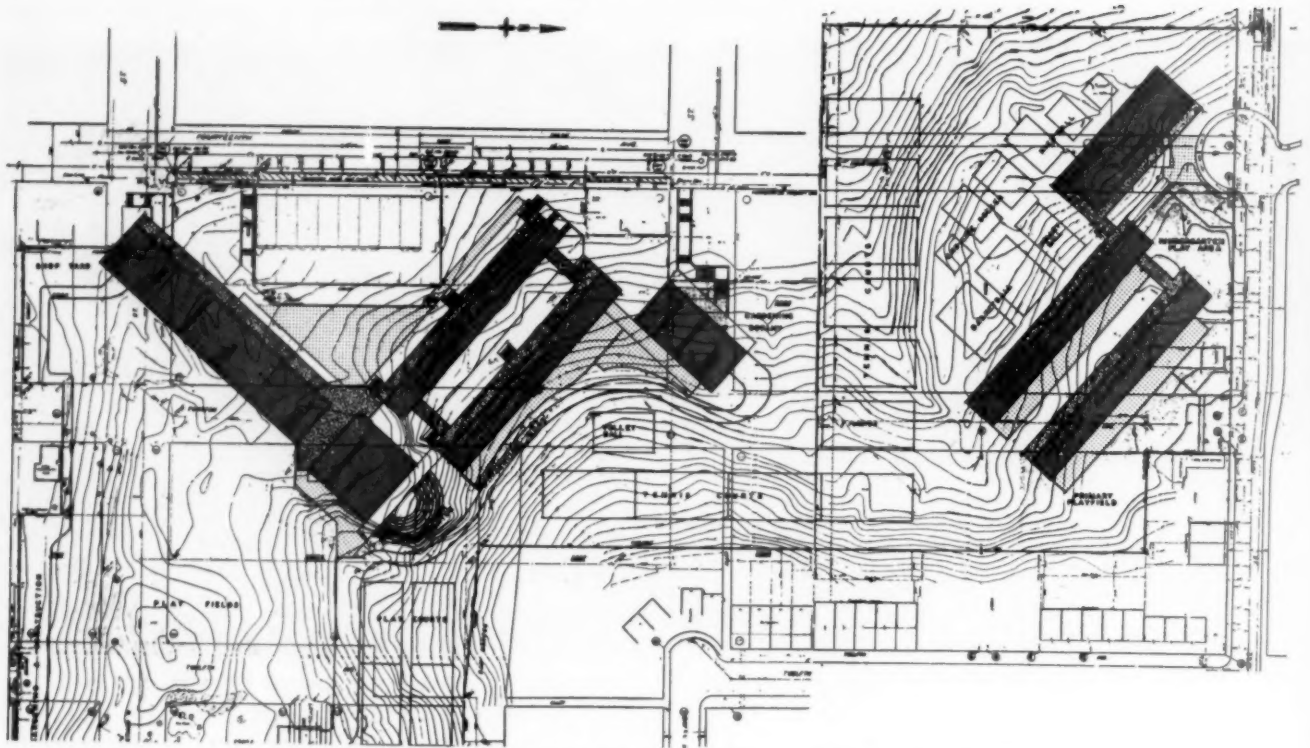
A native of San Francisco, Mr. Stoffer received his M.A. degree at Stanford University. During World War II, he served as an engineering specialist with the rank of Lieutenant Commander. Mr. Stoffer has been associated with school work for the past 25 years. He is now Assistant Superintendent in charge of Buildings and Grounds, San Francisco Unified School District.

surveys of them. The school consultant emphasized the importance of the site survey.

### Purpose of a Site Survey

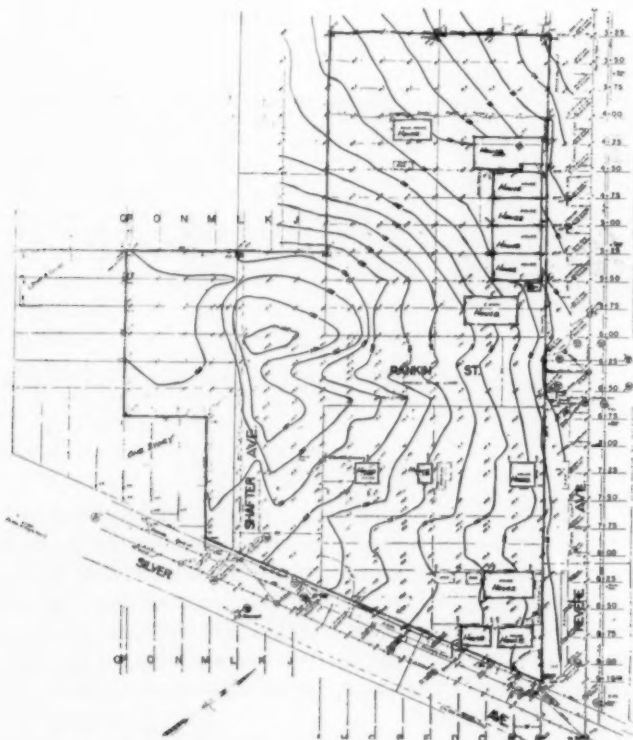
Because of our changing concept of educational needs, the trend toward outdoor classroom space and the diminishing number of good school sites, the architect must take advantage of every desirable feature of the chosen school site. Only hilly sections in some cities remain available for future schools and, in most instances, the more desirable of this land is used for residential housing.

The architect must have an accurate site survey



A combination site on a hillside for an elementary and junior high school.

before he can begin the solid part of his design—work areas, spaces, levels. He must know all physical, mechanical and service facilities. He must translate



Reproduction of a site survey of highly irregular land.

the necessary site development in terms of money allocated for that purpose. Here in San Francisco, new school sites have presented great variations: sand dunes, clay hillsides intermingled with red rock, irregular areas, and fertile farm lands.

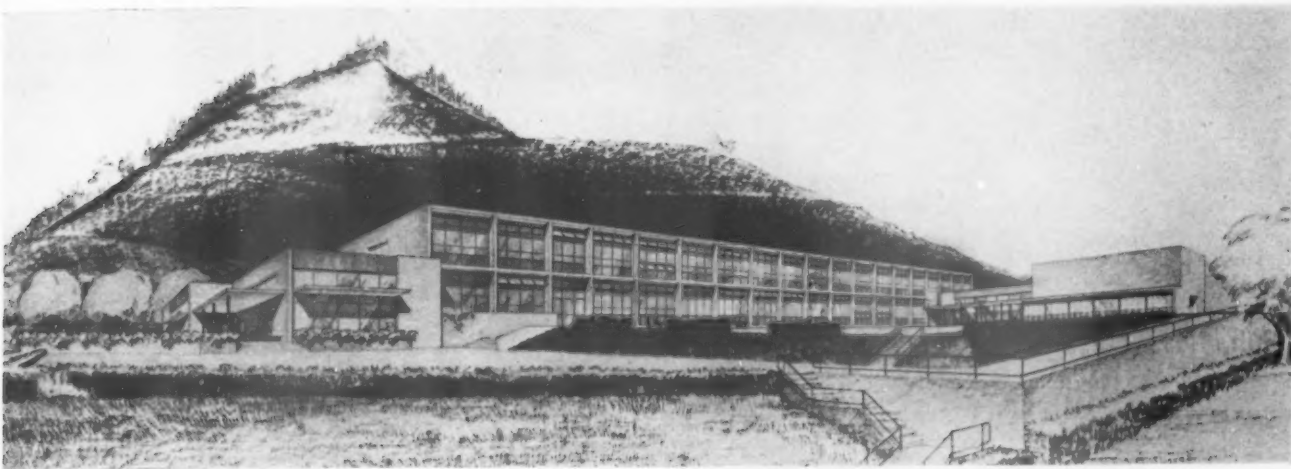
A civil engineer or a licensed land surveyor in all instances will undertake the site survey. If the city organization includes a department of engineering, the city engineer should be called upon.

A professional survey will include all necessary information in an easily understood and recognized report with an aerial photograph of the site. We have discovered that an aerial photograph aids in determining the value of contour and natural vegetation.

All facts about the site should be gathered and presented on the following standards for engineering surveys. We used them in many cases. Completeness in such surveys has been essential or considerable delay has resulted.

#### Standards for Topography

1. Type of survey
  - a. A topography survey indicates general survey information, but the elevation of land is given at regular point intervals in hundredths of feet.
  - b. A contour survey is the same as a topography survey except the elevation of land is shown by a continuous line at regular vertical spaces, usually 5'-0".



Miraloma Elementary School makes maximum use of its hilly site. Masten and Hurd were the architects.

2. Natural vegetation should be designated by types and kinds of trees and shrubbery.
3. General weather conditions should be shown.
  - a. Prevailing wind direction.
  - b. Prevailing storm-wind direction.
4. Condition and type of soil at ground level.
5. Elevation of adjacent streets and curbs.
6. Points of the compass should be indicated.
7. Furnish all available information regarding old waterways, ponds or low areas that have been filled in and subsurface conditions that might require an unusual type of foundation or water-proofing. This may require a geologist's services.
8. Furnish such surface levels essential to the preparation of estimates for excavating and grading. Where the surface is at a fairly uniform grade,

elevations at 25-foot cross section points will be sufficient, but where there are marked depressions, old cellars, wells, vaults, privy vaults, cess-pools, cisterns, or embankments, the boundaries of these should be indicated by lines. Such additional elevations necessary to give a clear indication of the conditions should be furnished.

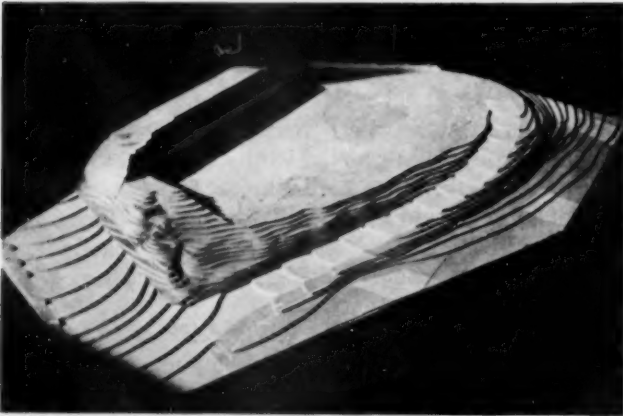
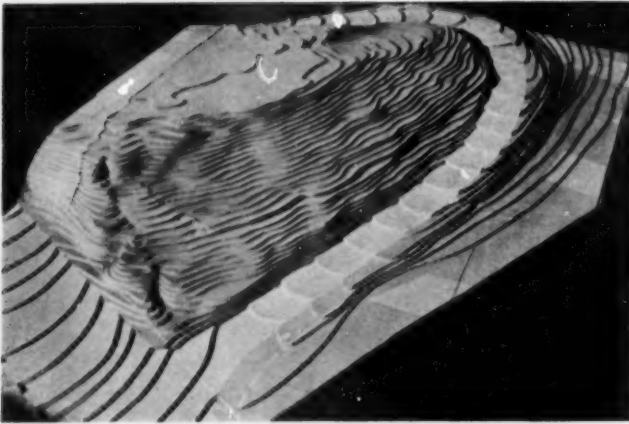
#### Standards for Boundaries

1. A clear description of the boundary of the site.
  - a. All necessary horizontal dimensions and elevations of site in feet and inches.
  - b. Dimensions and bearings of record lines. Curved lines should have the tangent or chord angles indicated.
  - c. Relating as many lines to each other as prac-



An unusual condition on a hillside in Candlestick Cove. The architect could not have found a solution to the location problem of a school without a site survey. Contour models are shown on the next page.





Contour models of an elementary school site in Candlestick Cove.  
Top shows original site; above, site after excavation.



Contour model at left showing model of the elementary school of the altered site. This excavation required a corresponding amount of retaining walls, footings, and structural foundations. A geologist was engaged to interpret soil conditions from borings on the site.

tical. Relate lines of survey to all street lines of the block. Corner stakes, preferably those used in running the record lines, are to be driven and left for future use for locating the plot.

d. Any necessary information of change of grade within 25 feet of the property line.

2. Indication of all improvements.

a. Streets or avenues should be indicated with widths and present names. If they have been renamed, give old name in parentheses.

b. Where there are existing street curbs, the high point should be established as survey datum and designated as Point A-0'-00" (actual). If there is no existing street curb, establish a substantial physical bench mark and designate it as Point A-0'-00" (theoretical). Locate all other nearby monuments. Where additional property is to be linked with property shown on a previous survey, or where a survey is resurveyed, point A of the previous survey should be used for the new survey.

c. Indicate the elevation of curb intersections, street lines, street and property lines and curve chords and street lines. Indicate also the elevation at all points of change of street grade. All these points should be located by dimensions.

d. Locate by dimensions, lamp posts, electric and telephone poles, elevated road pillars, sewer catch-basins, depressed curbs, and trees.



Aerial photograph of the elementary and junior high school sites previously shown facilitates the formulation of avenues of approach from the community. Such photographs are especially valuable when a hillside site is in mind.

Locate existing buildings on the site. Existing school buildings on site should have first floor and cellar elevations shown.

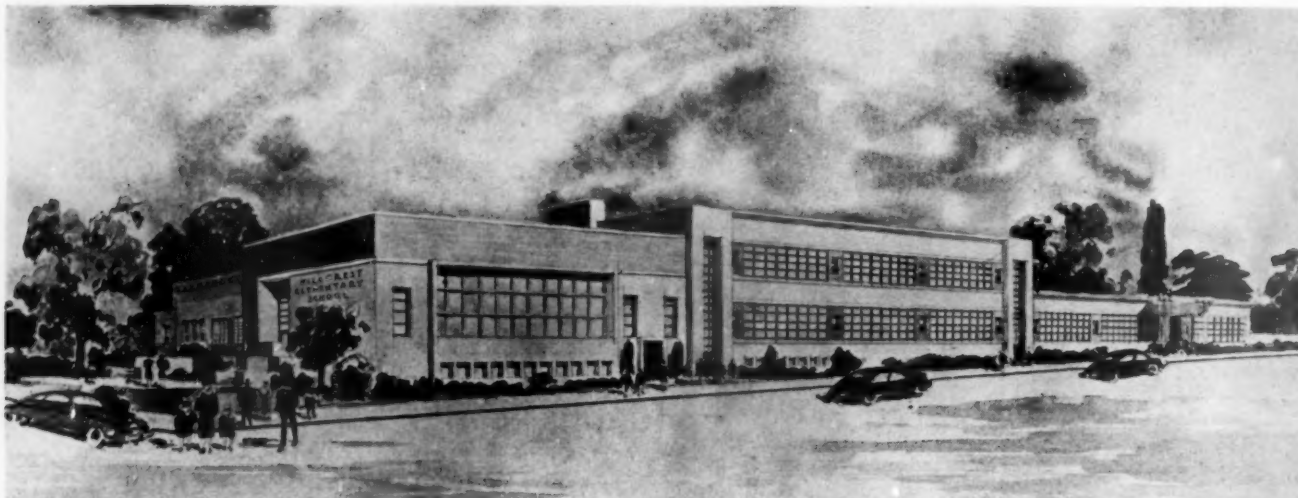
- e. Existing buildings on adjoining property which are clear of record lines should be treated generally the same as buildings on site. Show all encroachments along record lines of buildings, retaining or fence walls, fences, and indicate accurately the amount of encroachment at various points. Locate adjoining buildings by dimensions and give elevations of main and extension roofs and parapets. Indicate chimneys within ten feet of the line by dimension and elevations.
- f. When surveys are ordered for additional plots adjacent to existing improved property, the

survey should include full information regarding conditions on that part of the original school property between that side of the building which is adjacent to the new plot and the record line. The location and bearings of such dimension lines should be made clear so that the exact location and angles of the building can be determined.

- g. Give number of block, lot and houses existing as well as newly acquired property.

#### Standards for Facilities

1. Indicate water mains, inside and outside property, with size and location by dimensions from curb lines.
2. Indicate sewer lines by size, material and loca-



Hillcrest Elementary School, as well as Fremont School pictured earlier, was planned by survey standards outlined in this article with the city engineer's staff. Day and Michelsen, Architects.

- tion from curb lines. Manholes should be located by dimension from building lines with the invert elevation of each manhole given. Indicate the type of sewer—private, sanitary, storm water. Provide all available information.
3. Gas mains should be indicated. Give size and location by dimension from curb lines. Indicate valves and meters.
  4. Indicate amount and type of available electric power.
  5. Dead ends of sewer, water or gas mains should be located from property lines and marked dead end. Where there are no sewers, water or gas mains, clearly indicate that there are none.

#### Standards for Drawings and Prints

1. Title should be in the lower right hand corner of the long side of the sheet. Title should include the name of the school and the location of the site designated by city area and streets.
2. Drawings should be made to a scale of  $\frac{1}{16}$  inch equals 1 foot-0 inches if possible. Otherwise 1 inch equals 20 feet-0 inches.
3. Where changes or additions are necessary after a survey has been delivered, revised copies, so marked, should be submitted. Original information should not be erased but should be crossed

out and new information added adjacent to the old.

4. A legend should be included.
5. A licensed engineer or surveyor should be employed to undertake the survey and drawings.
6. The survey should bear a statement that all of the above regulations have been checked.

Many of these standards are included in Dr. Engelhardt's study, *Planning Guides For San Francisco's School Buildings*.

#### When Survey Is Necessary

There should be little or no delay in the construction of a school building. Since many architects find it necessary to construct a small scale-model of the site as an aid in approaching the problem, the site survey must be completed prior to the architect's selection and no time will be lost after he has received his contract.

Development of play and recreational area specifications are often affected by site restrictions. The relation between various units of the school depend upon the contour of the site, its shape and various approaches from the community to it. The site survey should be completed immediately after the selection of the site and presented to the school housing consultant before completing educational specifications.



# FINANCES IN THE OPERATION AND MAINTENANCE OF SCHOOLS\*

By HARRY HEWES

Office of Public Information and Reports, General Services Administration, Washington, D. C.

WHEN Uncle Sam is the richest citizen of your community, when his property is worth more than all the other assessed valuations put together, and when he does not pay a nickel in local taxes, somebody is likely to get pinched. Victims in many communities are school children.

This is the picture in broad strokes of hundreds of tax-supported school districts throughout the country. It is a situation approaching downright educational privation created by removal of land from tax rolls by federal acquisition or ownership. It also exists because many children are enrolled on federally-owned property which brings no local tax income for school purposes. Where to find the money is another tough problem for heavily burdened school authorities. Many of them already face an impact of troubles with inadequate or obsolete school plants, increased pay for teachers, and expanded enrollment.

## Federal Aid to Date

Each year since the heavy population shifts during the war Congress has made appropriations to assist school districts in meeting maintenance and operation costs where their problems are complicated by federal activities. These contributions have been administered on a deficit financing basis by the Federal Works Administrator. They now are taken over by the Administrator of General Services—Jess Larson. (Functions of the Federal Works Agency were incor-

Mr. Hewes is a veteran correspondent and critic. He was educated in the public schools of Grand Rapids, Michigan and the School of Civics in Chicago under a grant from the University of Chicago. In 1936 he became press consultant to WPA Project No. 1, the Federal Arts Projects, and in 1941 he joined the Office of Information staff of the Federal Works Agency. He is now a senior information officer with the General Services Administration.



porated into the new General Services Administration on July 1, 1949.) Congress appropriated \$7.25 million for the 1949-50 school year. Pere F. Seward, commissioner of GSA's Community Facilities Service, is in charge of the assistance program.

During the 1948-49 school year 147 school districts received federal contributions. In 1944-45 more than 400 schools were receiving almost \$13 million in Lanham Act funds for maintenance and operation costs. Since then other federal agencies, including the National Military Establishment, the Bureau of Reclamation, and the Atomic Energy Commission, have been authorized to assist distressed schools in their installation areas.

## Projected Federal Aid

The 1949-50 program will be administered on a deficit financing basis for all school districts approved to receive such assistance, Larson explained. But, this assistance is administered on a year-to-year basis.

"In determining the deficit, the total income from all sources available to the school agency for main-

\* President Truman in his Reorganization Plan Number 16 recommended transfer of the so-called Maintenance and Operation Program for schools to the Federal Security Agency.

tenance and operation costs will be considered," he said. "These schools should exhaust every possibility of obtaining revenue. Additional funds may be made available through adjusted tax rates, increased assessed valuations and special state aid for teachers' salaries. Some legislatures took action to increase state aid during fiscal 1950.

"This point should be made clear. None of this money may be used for construction and deficits caused by capital outlay, other than reasonable amounts for repairs and replacements. In the case of each applicant for assistance the state authorities will be asked for an opinion as to the reasonableness of the school's operating budget and the accuracy of the estimated deficit.

"The General Services Administration will assume no supervision, direction or control over personnel or program of instruction in any school, local district, or state system."

#### Hearings Begin

H. R. 4115 was among about 45 bills before the 81st Congress proposing some kind of federal assistance to public education. Representative John Lesin-

ski, of Michigan, introduced it to "provide for the education of children residing on certain nonsupporting federally-owned property, and children residing in localities overburdened with increased school enrollments resulting from federal activities in the area, and for other purposes." Subcommittees of the House Committee on Education and Labor, of which Mr. Lesinski is chairman, called a series of public hearings late in 1949 in several federally-impacted areas all over the country. B. Alden Lillywhite, Community Facilities Service, GSA, and Henry S. Alves, U. S. Office of Education, Federal Security Agency, sat as consultants with congressmen at the hearings.

Hearings opened in Washington on October 10. They continued the remainder of the year and produced records that fill about 3,000 printed pages. Evidence is in them that many existing problems are residual from the tremendous expansion of the defense program and the war years.

War workers and their families swarmed into production points and overwhelmed by sheer numbers facilities for reasonable living: housing, utilities, and service provisions. War production could not be impeded. The Federal Government on a historic scale

*Photos by B. A. Lang*



The 500 housing units built by the FHA in Orange, Texas, typify war-born towns that strain local schools.



Panicky citizens participated in a subcommittee hearing: school enrollment in Orange jumped from 2000 to 9000.

built housing, hospitals and schools. It ran in water and sewer lines, and provided recreation centers. Some schools were built only for the duration, since it was assumed that incoming war workers would return to their homes when the big money of war production plants was no longer forthcoming. But the new population often stayed.

#### Booming Orange

Orange, on the Sabine River in southeastern Texas, is somewhat typical of a war-impacted community with residual school problems. Representative Cleveland M. Bailey of West Virginia, an educator, presided at subcommittee hearings for school authorities and interested citizens.

Sometime in 1940 a civic-minded resident fastened a legend on the Gray Bayou Bridge on Route U. S. 90—"Orange Welcomes You. Population 7372." Four years later the "welcome" might have been deleted by a jammed-up, frenzied community that was turn-

ing out one combat boat a day, including Sundays. The population notation could then have read 50,000. Today the population is around 40,000. It is expected to remain 40,000 as long as the Navy maintains its berthing station there.

The Federal Government rushed work on housing, schools, mass transportation, and other community facilities to ease individual shock in the abrupt changes of living habits of Orange newcomers. Demand for a vigorous educational program was insistent. Schools first, right after housing! Orange must have schools or the war workers would walk out, they said. Some 8,000 federal housing units of all types went up. The Federal Works Agency, operating with Lanham Act funds under its War Public Works Program, built or contributed to school facilities in Orange for more than 9,000 pupils. FWA assumed, like everybody else, that in postwar years the town would return to something like its prewar size, so many of these were only temporary structures. They were



thoroughly unsuitable for long and continued service.

Look at the picture the Congressman saw in November, 1949! The shakedown minimum is 5,100 pupils and Orange requires adequate permanent school facilities for an elementary and secondary school population of that number. Prewar Orange had classrooms and other facilities for 2,000 pupils in a local school system. It had been a notably good one in a settled and well contained community. The catch today is that hundreds of pupils come from Navy installations which contribute nothing in taxes, or from federal housing which contributes a bare pittance in lieu of taxes to school support.

#### Here Lies the Fault

After the war the Navy remained in Orange. The Texas group of the Atlantic Reserve Fleet and the

Naval Station are centered there. On November 1, 1946, the Navy took over an installation of 500 houses built for war personnel from the Federal Housing Administration. This immediately cut off yearly payments of \$9,000 in lieu of taxes. Value of property owned by the Navy in Orange County is estimated at \$8,707,000, but the Navy maintains no educational facilities. The local school system receives no tax compensation from Navy personnel for educational facilities available to the 138 children of Navy personnel or civilian employees.

Captain Jose M. Cabanillas, commanding officer of the Orange Naval Station, appearing before the congressional subcommittee, quoted from a statement of the Navy Department's Office of the Fiscal Director:

"The Navy Department recommends the early adoption of a broad program for handling federal



Portion of Naval berthing station and housing units at Orange. Population rose from 7,000 to 50,000.

financial assistance to local school districts for the education of dependents. The Navy desires that this, the budgetary responsibility for the support of state educational systems, be transferred elsewhere so that its budget will be more realistic as to the dollars needed for national defense purposes."

This was a statement, Captain Cabanillas said, in which he wholeheartedly concurred.

At an earlier hearing of the committee in Washington, Major Gordon Tapper, speaking for the Department of the Army, earnestly recommended favorable consideration of H. R. 4115 "in order to replace the temporary and inadequate assistance program presently provided by the Army in the solution of the problem." He estimated the Army would have to assist more than 20,000 children in fiscal year 1951 at \$110 a pupil and perhaps 25,000 children at \$125 a pupil in fiscal 1952. These increases reflected an anticipated increase in Army housing and in schools requesting assistance.

#### Orange Needs Today

C. O. Chandler, superintendent of the Orange Independent School District, came to the point:

"The school district comprises 1,728 acres of which 405 acres are owned by the Federal Government," he told visiting Congressmen. "On this land are 1,638 homes and approximately 1,450 children. The total cost of educating a child averages \$158 per year; therefore the total cost of educating 1,450 children living on federal public property is \$229,100 per year. The school district receives payment in lieu of taxes of only \$13,000 from the United States Government to teach these children.

"In addition the Orange Independent School District has approximately 1,500 children coming from Riverside, Inc. This area was built by the government as a low-rent housing area and has been sold to a private concern. The total cost of educating children in this area is approximately \$225,000. The school district receives only \$10,000 for maintenance and operation purposes from Riverside, Inc. We maintain that Riverside, Inc., is a government responsibility because no private individual would develop en masse an area that has such low taxable valuation.

"During the war practically all expansion in industrial, residential, commercial, and business facilities, which normally would be taxable, was done in Orange by the Federal Government. Consequently, the town today has 40,000 people being served by about the same number of privately-owned business, commercial, industrial, and residential units as the prewar town.

#### Continued Federal Aid

"The only solution of our school finance problems will be continuation of federal assistance. Local revenue cannot take over the tremendous task of educating a scholastic population 40 per cent of which

comes from temporary housing constructed by the Federal Government. The Orange Board of Education has done everything possible locally to relieve its financial desperation by a recent tax reevaluation increasing property to the statutory maximum of 75 per cent on fair market value.

"Two methods, either of which would solve the financial problems of the Orange Independent School District, are: payment in lieu of taxes by the Navy on naval property; or continuation in some form of the Lanham Act."

Lillywhite, as a consultant to the subcommittee, asked Superintendent Chandler how many temporary schoolrooms were in use. He said 63, out of a total of 158.

Lillywhite: So that more than a third of them are temporary rooms?

Chandler: That's right.

Congressman Bailey: Let me interpose a question at this point. If you issued the available bonding capacity, would it in any way be adequate to replace those 63 rooms?

Chandler: Not if we built permanent classrooms.

Bailey: I assume you would build permanent classrooms, if any.

Chandler: It would be foolish to spend public money on something to be permanent and not make them permanent buildings. We are definitely interested in schoolhouse construction. We need the facilities badly.

Superintendent Julian P. Greer of the Vidor Independent School District, Superintendent Hardy Hairston of the Cove Independent School District, both adjacent to Orange, and R. W. Gary, of the Beaumont School District, appeared before the subcommittee in Orange.

#### Countrywide Dilemma

Hearings in Orange were similar in procedure to other subcommittee sessions in Boston, Detroit, Dayton, Oklahoma City, Fort Worth, San Antonio, Los Angeles, San Francisco, Norfolk, Virginia; Cherry Point, North Carolina; Charleston, South Carolina; Phoenix, Arizona; Bremerton, Washington; and in other localities where federal installations impose problems on local school districts.

In 1948 FWA's Bureau of Community Facilities, now Community Facility Service, GSA, made a study at the request of the House Public Works Committee. The report covered localities where the problems of school plant and operations were complicated because of activities of the Federal Government. These findings have not in any way lost their point.

A list of areas was established where federal activities were known to have placed a burden on the local school systems. The list was based on specialized knowledge of the U. S. Office of Education and state departments of education in determining educational needs, and the special skills of the Bureau of Community Facilities in evaluating construction

and finances. After that, each area was surveyed.

Data were obtained on total immediate school construction needs in these districts. The portion of these needs attributed to federal activities was also investigated. The extent to which state and local resources can meet the need, and what part of local problems school districts reasonably can be expected to work out for themselves, were other considerations.

The field forces screened out reports of areas where federal impact was too slight to merit inclusion. Information on 422 districts then was forwarded to Washington. Here the reports were screened again and 27 districts were eliminated.

#### Areas of Greatest Concern

The 395 reporting school districts are in 39 states, the District of Columbia, and Alaska. Greatest concentrations were found in California (86), Texas (38), Washington (34), Michigan (24), Pennsylvania (23), Georgia (15), Arkansas (14), Virginia (12), with nine each in Alabama, Illinois, and Ohio. Concentrations in certain states reflect defense and industrial activities during and subsequent to World War II. Reporting areas are largely those the Federal Government helped with housing and community facilities during the war.

The 395 school districts reported that expenditures aggregating \$168,843,178 had been made between the

last normal year of enrollment and June 30, 1948, of which \$36,726,011 was in federal funds. Thus local communities spent approximately three and one-half times as much as the Federal Government for educational facilities in this period. Federal funds shown are those allocated under the Lanham Act during the war years when schools, as well as other public facilities, were constructed as federal or non-federal projects to relieve the impact of war migration.

The report now inquires, "How much have these 395 school districts to contribute toward meeting their problems now?"

Additional floor space needed has been estimated at 25,247,947 square feet of which 11,956,485 square feet is attributable to the increased enrollments due to federal activities. And these school districts, utilizing all present available resources, have about \$212,221,000 to meet a need estimated at \$348,132,500. To bring their school plants to par would cost \$135,911,000 more than they now have, or can get, without federal help. And these reporting districts are by no means all of those that need assistance. Their problems are aggravated by federal impact. The report concludes:

"This need is not one that should await a long-term building program; it is a situation that, immediate and with deep impending penalties threatened, should be met now."





School in San Antonio, Texas. B. K. Wyatt, Architect.

*Courtesy Stran Steel*

## ADMINISTERING A CONSTRUCTION PROGRAM: A Comparison of Methods

By JOHN C. WARNECKE

Miller and Warnecke, Architects, Oakland, California



A native of the San Francisco Bay Region, John Carl Warnecke is a graduate of Stanford and received his B.Arch. at Harvard. In 1943 he was Chief Building Inspector and Assistant Technical Director for the Housing Authority of Richmond, California. At present he is a partner in the firm of Miller and Warnecke, Architects. He is also a member of the Board of Appeals and Adjustments for the Building Department of Oakland.

**N**O PREDETERMINED method seems to exist for guaranteeing sure-fire results in the administration of a construction program. Every method has its shortcomings; examples of each type working successfully can be seen throughout the country.

The application of any method must follow a careful analysis of the particular problems. Success then depends upon two main factors: the type and size of the building program, and the individual calibre of the personnel directing it.

### Architect Handling Complete Program

This is perhaps the most simple and direct method. However, the architect or firm of architects considered for the job must have adequate experience in organization to follow through. Several items also must be considered such as, will all buildings in the program be built at one time or over a period of years. Uniformity of design and appearance in a college campus group of buildings is best achieved by retain-

ing one architect. If the administrative staff and faculty have devoted intelligent study and time to the building problems, then formulation of the program can be achieved without too many pitfalls.

Berkeley public schools are an example of self-survey (by committees composed of administration and faculty). The staff set up committees to work with the architect and help coordinate the survey into an actual program. The general building committee for junior high schools consists of the superintendent of schools, assistant superintendent of schools in charge of construction, chief of maintenance department, chief field inspector for new construction, and principals of three existing junior high schools. Subcommittees are departmentalized within the school. For example, the junior high school art committee is composed of one junior high school principal as chairman and the rest, junior high school art teachers.

One of the real advantages of a self-survey is that the personnel which eventually use the buildings have an actual voice in determining their needs. If it does nothing else, it keeps the faculty content because they will not complain that they were forced to take a classroom, shop, or building they did not approve.

#### Some Disadvantages

Under this arrangement the architect is expected to act in many respects as a member of both the administrative staff and the faculty. He must project himself into their being so he can turn around and tell himself and his staff how to design the buildings. For many projects this actually can be accomplished and is carried to a successful conclusion. In other cases, the architect is bogged down from the start because of lack of information. If no one has a clear-cut picture as to just what type of buildings will be needed, size of buildings, size of rooms, type of building materials, etc., then an educational and architectural survey is in order.

The task of conducting and directing a self-survey is often too great and too time-consuming for the architect working under normal fees for school work. If a complete survey is to be requested by the architect, then he should have additional compensation for this phase of investigation.

Where self-survey is conducted without technical guidance, the results are too often a program which is either one-sided or cannot be met by budget or construction costs. No one is actually employed by the school district or college with full architectural and planning training. No one on the administrative staff or faculty, by virtue of his architectural training, fully understands the complete function and technical language of the outside designing architect. As a result, great responsibility is placed into the hands of the "outside" designing architect.

#### Supervising Architect Handling Program

In general, this method of administration is similar to the first with the exception that the actual architec-

tural work is handled by more than one outside architectural firm. The supervising architect controls the other architectural firms on such matters as adherence to master plan, design and appearance of buildings, general standards of construction, electrical, mechanical systems, etc. He usually designs the master plan and is reimbursed for this work and that of supervising other architects on the basis of approximately 1 per cent of the cost of construction work handled by the other architects, or a fixed sum paid on a yearly basis.

Sometimes for political reasons or because of large scale construction the program is broken up into smaller segments. A supervising architect then is the best answer to control general overall program, master plan, features of construction, design and appearance of a group of buildings on any one campus.

Because of their large construction program amounting to over \$100 million, the University of California at Los Angeles, and until recently the University of California at Berkeley, has used this method of controlling architectural design of a group of architects.

Other similar attempts have been made by appointing several architects to a so-called board of architects whose purpose is to design the buildings of a large construction program. This method is less successful than the supervising architect method. The board inevitably ends in disagreement with the burden of the work falling on one architect's shoulders. The other architects go along for the ride. Municipalities, school boards and other institutions who have used this method of administering large construction programs seldom attempt it twice.

The supervising architect, besides acting in his capacity, is usually given his choice as to what building or group of buildings his firm will actually design completely. Attempting to control the other architects' designs is difficult. If buildings are to harmonize in design, appearance and detail, then the supervising architect must practically complete the preliminary plans of all buildings. The others become merely a drafting service. Many architects are hesitant about giving up the privilege of designing in the style in which they have made their name.

#### Supervising Architect and Technical Director

This middle-of-the-road policy works well for a medium sized construction program where there is little duplication of building types. The University of California provides an example on a greatly expanded scale. It employs a supervising architect for certain campuses.

The technical director must have experience in architecture, structural, mechanical and electrical engineering, field supervision, building contracting (office and field), and survey conducting. He must be able to conduct committee meetings, write reports, etc. For entirely new construction programs, he can be retained at the very start. Working with the supervising architect, superintendent, administrative staff

and faculty in developing a survey, program, master plan, etc., he becomes liaison representative between college and architect. Educational building consultants may be retained for short periods on specified difficult problems. If the program becomes too large for one "outside" architectural firm, additional architects may be brought in.

In the beginning when there is no actual work to be done in the way of surveys and programs, the technical director may join the staff of the designing architect in developing the working drawings. During such periods he is on the payroll of the designing architect.

By maintaining a spirit of close cooperation and by actually working in his office, the technical director thoroughly familiarizes himself with all aspects of the architectural, structural, mechanical, electrical and engineering and working drawings. He eventually is in an excellent position to know all about the details in respect to actual full-time field supervision of the construction work and also for the proper maintenance of the school or college plant.

The designing architect generally supervises the construction work, makes all full size details, checks shop drawings, directs the work of the contractor in respect to field work, handles all correspondence, contractors' certificates of payment, change orders, etc. He does not spend full time on site supervision, as set up by state law for public school work. The technical director, who is already thoroughly familiar with the overall plans and working drawings and details of the building, is the best qualified person to head up this phase of the work. He may perhaps need additional personnel, selecting field superintendents from the outside or prevailing upon the designing architect to lend to the school district one or two members of his staff.

Being familiar with all phases of construction up to this point, the technical director would be the logical choice for heading up and directing maintenance.

#### Educational Building Consultant

As an impartial and unbiased expert, this person takes a load off the shoulders of the administrative staff, especially where local politics runs high. Important decisions, made by the superintendent of schools, school board, etc., can be voiced through the "outsider."

For large school districts which do not maintain a full-time department of architecture, the employing of an educational building consultant puts a specialist into the position of guiding the program. He is capable of setting up standards with progressive trends and of coordinating programs and plans of many architectural firms.

For small school districts, the consultant is of great value in developing an educational master plan, programs, etc. The less informed superintendent of schools and/or architects in small districts and communities may benefit greatly from the progressive thinking and overall planning of the specialist.

The weak link in this method is that the educational consultant is here today and gone tomorrow. Relatively few good ones exist and they usually operate on a countrywide basis. This may result in the standardizing of reports for several different school systems.

The educational consultant usually is trained in education, not in school planning and architecture. His report, survey, and standards are instruments the architect uses to design the building. Without complete architectural training, the consultant falls short of completely analyzing the entire program.

#### Department of Architecture

The Department of Architecture controls and handles the development of all programs, standards, preliminary plans, working drawings, specifications, and has complete supervision.

In large school districts where, for instance, several schools are to be built during one period of time, a standardized program provides the same type of facilities for all students. No favoritism is shown for any particular school. If individual architects were to have their say in helping to determine the program, somebody's ability and personal character would rise above another's and inevitably certain schools would be better off than others.

The same arguments can be used for standardized details of construction. Opinions which favor these arguments further contend that once the department finds a certain type of window or light fixture that is satisfactory, why not use it throughout the entire school system?

With standardization, the job of maintenance and repair is cut down considerably. Schools with identical types of heating systems, plumbing systems, electric systems, etc., can be checked and maintained with ease and less expense in labor.

The full-time department of architecture is always available for consultation, survey work, and developing standards. Small construction jobs which continuously go on in the repair, modernizing and maintenance of a large school system are expedited. Many of these small jobs require complete plans and specifications and yet they are of such nature that it is not practical to hire an outside architect nor does the type of job interest him.

The successful operation of a department of architecture which develops the complete plans and specifications depends primarily on the personnel that makes up the department. As a general rule, the best qualified architects and engineers desire to work for themselves and maintain a professional practice. Heading up departments of this nature limits their professional abilities and compensations. With business activities at a high level during the past ten years, architects have been enjoying steady practice.

Departments of architecture which handle complete architectural services have a tendency to build up large staffs during times of heavy construction ac-



tivity. Once a staff is built up into a going and working organization, it must be maintained during periods of quiet construction activity so that it will be intact for some future building program. This is not only a costly procedure, but tends to stagnate the department. The men are often kept busy in developing programs and standards which probably are outmoded by the time the actual construction program is ready to proceed. Because of lack of competition by the members of the staff, they are not forced to keep up with the social and technical trends which are continuously moving onward.

Where a department of architecture is kept at a minimum staff and is supplemented by "outside" architects during periods of heavy construction activity, several items are considered undesirable by the "outside" architect.

Such a department develops programs, site plans, preliminary studies, standards, handles all contract documents, and completely supervises the construc-

tion work. The "outside" architects further develop the preliminary studies, complete the working drawings and write the specifications. They are limited in giving their best efforts from the very start. They have no say in helping to develop the program. In many respects, they are being retained as a glorified drafting department.

Before proceeding with the work, the "outside" architect knows in advance that his finished building will be in most respects almost identical to his competitors' work. He does not even have the chance or feeling that he can develop a school that will be designed and constructed along the best techniques that he knows, or that are known in the country today.

The author's firm has worked directly or indirectly under all these methods of administration. Any one, or a combination of two or three, may be used successfully if applied correctly. The pros and cons of the five methods given here may be of help to an administrative staff taking on a construction program.

# A GUIDE FOR THE ORGANIZATION AND EVALUATION OF COMMUNITY JUNIOR COLLEGES

By H. E. JENKINS

President, Tyler Junior College, Tyler, Texas, and Chairman, Committee on Junior Colleges (Standards and Accreditation) Southern Association of Colleges and Secondary Schools

THE uniquely American institution, the community junior college, has by this time been in existence long enough for certain definite trends and patterns to develop in its organization and operation. While the community college will probably always be a very flexible institution, in which adaptation to community needs and continued experimentation are encouraged for constant progress, it is now possible to establish with some degree of accuracy and permanence certain minimum goals and standards.

The early junior colleges were largely "abbreviated senior colleges," and many had little to mark them as distinctive institutions. However, more progressive junior colleges have developed an institutional pattern that makes them unlike any other institution. Because they make a definite contribution to the American public system of education, they have been widely accepted, approved and supported by the general public. The community college seems destined to become an important part of the educational system in most of the states.

This role is what ex-President Wilbur of Stanford University envisioned when he said: "We can look upon the junior college movement which is now spreading throughout the United States as the most significant occurrence in American education in the present century."

As in the development of both the public high school and the senior college, various regional and other accrediting agencies have gradually devised and adapted junior college standards. These now embody the best thought on recognized practices and procedures for the establishment, organization, management, and operation of the institution. In their early development, most junior colleges were hampered by the rather rigid standards prescribed by accrediting agencies, which had not yet come to recognize either the worth or the nature of the new junior college. More recent standards of the associations, however, are formulated and based upon the philosophy of the



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junior college itself, rather than solely upon that of the senior college. In many cases they have been formulated by persons actually engaged in junior college work. For example, the standards upon which this checklist is based, those developed for the Southern Association of Colleges (1949) and those adopted by the Northwest Association of Colleges (1946), to mention only two, were prepared entirely by junior college administrators who were careful to include the basic philosophy, methods, and complete program of the junior college.

All standards are, of course, subject to criticism as well as necessary interpretation. This fact is fully recognized, but recent standards of accrediting agencies do present a rather definite basis and specific outline of considerable value to educational workers who are interested in the establishment, management, and operation of a junior college, as well as those who survey and evaluate an existing institution.

The checklist, or guide, on the next five pages is based upon a careful analysis of the standards for junior colleges of the five regional associations that accredit junior colleges (the Western Association, the sixth group, has no adopted standards): the Southern Association of Colleges and Secondary Schools, New England Association of Colleges and Secondary Schools, Middle States Association of Colleges and Secondary Schools, Northwest Association of Colleges and Secondary Schools, and North Central Association of Colleges and Secondary Schools.

## Community College Checklist

Directions: A check in the approved column indicates an approved practice or condition. A check in the deficiency column should be made in all other cases.

ORGANIZATION AND CONTROL	APPROVED	DEFICIENT
1. The junior college is organized as a non-profit institution	_____	_____
2. It is organized under the authority of the statutes or a charter	_____	_____
3. It is controlled by a legally appointed or elected board of control representing directly or indirectly an electorate	_____	_____
4. The board of control has independent authority to make final decisions	_____	_____
5. The terms of the members of the board of control overlap	_____	_____
6. The board of control is a legislative, policy-making body rather than an administrative body	_____	_____
7. The board of control acts through its constituted executive officers and upon the recommendation of the institution's administrative head	_____	_____
8. The organizational plan of the institution is graphically presented in the form of an organization chart	_____	_____
9. The president (or other designated chief administrative head) is the chief administrative officer, carrying the responsibility for execution of policies, selecting assignment and management of personnel, and general administration of the institution. He is responsible only to the board of control	_____	_____
10. The administrative staff is sufficiently and properly manned to carry out the work assigned to it	_____	_____
11. Outside influences are allowed to operate upon the board of control only through regularly constituted administrative officials	_____	_____
12. Appointments, promotions, and similar matters of personnel administration are accomplished by the board of control upon the recommendation of the administrative head	_____	_____
13. The institution is recognized as one of three types: a two-year unit; a three-year unit including the senior year of high school; a four-year unit including the junior and senior years of high school	_____	_____
14. If a three-year or four-year junior college, the whole institution is organized as a unit and functions as such. The junior college meets the prescribed standards in all of its years.	_____	_____
If it is a part of a public school system, it is organized as a unit in such a manner that it may be readily observed and evaluated in its operation, administration, financial management, educational program, and student accomplishments independently from all other units		
15. The enrollment is large enough to make possible the operation of a well planned and organized functioning junior college program	_____	_____

## CURRICULUM

1. The objectives of each type of curriculum are clearly stated	_____	_____
2. Curriculums are articulated with the work of lower and, where desirable, higher schools	_____	_____
3. The junior college offers two years of standard academic courses basic to senior college work in liberal arts or pre-professional fields	_____	_____
4. Terminal courses at the college level (post-high school) are offered in vocational education, including short courses	_____	_____
5. Terminal courses at the college level in general education, including short courses, are offered	_____	_____
6. Courses especially arranged for adults are offered	_____	_____
7. If the junior college is a four-year unit or a three-year unit, the appropriate years of high school work are given	_____	_____
8. All curriculums are adapted to community interests, conditions, needs	_____	_____



## ADMISSIONS AND ENTRANCE REQUIREMENTS

APPROVED

DEFICIENT

1. If the junior college is a two-year unit, it requires high school graduation (or an equivalent entrance examination) for admission to its academic curriculums \_\_\_\_\_
2. It requires either high school graduation or the attainment of eighteen years of age for admission to its terminal courses \_\_\_\_\_
3. If it is a three-year unit, it requires the completion of twelve units of high school work for admission; if a four-year unit, it requires eight units. An equivalent entrance examination may be substituted \_\_\_\_\_
4. Subject matter patterns in high school, qualities of personality, test ratings, rank in class, and other similar data are considered in admitting students to the various curriculums and courses \_\_\_\_\_
5. Transfers of students from other colleges are made only upon receipt of official transcripts \_\_\_\_\_

## FACULTY AND INSTRUCTIONAL SERVICE

1. The administrative members of the faculty have special training and, in the majority of cases, experience in the junior college field. Special training includes the history, purpose, methods, organization, and the philosophy of the junior college as well as special training in administration \_\_\_\_\_
2. The administrative members of the faculty hold a master's degree or an equivalent degree \_\_\_\_\_
3. The members of the academic instructional staff hold a master's degree or an equivalent degree. Each exception is justified in terms of institutional efficiency and student welfare \_\_\_\_\_
4. The members of the instructional staff have special training in the field of the junior college including its history, philosophy, purposes, methods, and organization \_\_\_\_\_
5. The members of the academic instructional staff teach in the fields of their graduate specialization \_\_\_\_\_
6. The members of the instructional staff who teach terminal courses or fine arts courses should be college graduates with majors in the field taught. In addition, they have at least three years of successful experience as a professional practitioner in the art or vocation. For each year of deficiency in college training, an additional year of such experience may be substituted \_\_\_\_\_
7. The faculty is organized so that: (1) its instructional efforts are effective; and (2) it is encouraged to exercise initiative and to participate in matters of institutional welfare \_\_\_\_\_
8. There is a program of in-service training which includes: (1) a program of well planned and administered professional faculty meetings with faculty participation; (2) a program of induction and orientation for new members of the staff; and (3) a program of institutional self-survey resulting periodically in institutional progress \_\_\_\_\_
9. Faculty members belong to learned and professional organizations appropriate to their fields of specialization and they attend meetings of these organizations \_\_\_\_\_
10. The ratio of faculty members to student full-time enrollment does not exceed one to twenty-five \_\_\_\_\_
11. There is provision for a faculty retirement plan, sick leave, reasonable tenure, health insurance \_\_\_\_\_
12. The salary schedule is sufficient to secure and retain faculty members of thorough training, experience, and proper personality. The minimum salary varies, but in no case is less than \$2400 for nine months for a beginning instructor without experience. Suitable increments are provided for continued successful experience\* \_\_\_\_\_

\*The median salary for instructors holding master's degrees, reported by a group on seventeen Texas junior colleges in November, 1949 was \$3760. The range was \$2379 to \$5485.

## FACULTY AND INSTRUCTIONAL SERVICE (Cont'd)

APPROVED DEFICIENT

13. Faculty members enjoy and appreciate to the full the civil liberties which belong to citizens in general and they have, but do not abuse, academic, personal, and educational freedom

## INSTRUCTIONAL METHODS AND CONDITIONS

1. Provision is made for the adjustment of instruction to individual differences and student needs
2. Instruction itself is emphasized rather than research
3. There is a program of curriculum survey, planning, development, and revision in which faculty members participate
4. Textbooks are carefully selected
5. Syllabi are developed and kept current
6. The examination procedure is carefully planned, organized and administered
7. There is effective use made of standard tests
8. Courses and subject matter are articulated with lower, and where desirable, higher schools
9. There is systematic instruction for all students in the use of the library
10. Visual and auditory aids are used effectively
11. The standard teaching load is sixteen semester hours. Eighteen semester hours is the maximum permitted for any instructor and this maximum is permitted for only a small percentage of the faculty
12. Faculty assignments to committees, administrative duties, and other non-instructional service are considered in reducing the permitted instructional load proportionately
13. The total student credit hour load per instructor does not ordinarily exceed 450 per week. Each deviation is justified by the junior college in terms of institutional efficiency and student welfare
14. The maximum student load permitted is eighteen semester hours, and this is only to a small percentage of the student body
15. Classes do not ordinarily exceed thirty students. Exceptions are justified by the junior college in terms of institutional efficiency and student welfare
16. For graduation from the junior college it requires:  
If it is the two-year college the completion of sixty semester hours including the subject matter and quantitative requirements of the particular curriculum which the student is pursuing  
  
If it is the three-year or four-year type, it requires, in addition, that the student meet the local requirements for graduation from high school  
  
Graduation from vocational-technical curriculums or courses depends upon the satisfactory completion of the courses or curriculums

## STUDENT PERSONNEL SERVICE AND STUDENT ACTIVITIES

1. There is a well balanced program of student activities under student management with faculty cooperation and supervision
2. There is an organized systematic program of preregistration and at-registration guidance, orientation and induction for students, providing personal, educational, and vocational guidance
3. There is an organized, systematic program of guidance and student personnel service which functions throughout the college year, affording educational, personal, and vocational guidance to students

## STUDENT PERSONNEL SERVICE AND STUDENT ACTIVITIES (Cont'd)

APPROVED

DEFICIENT

4. A standardized testing program is a functioning part of the guidance program
5. Placement and follow-up services are provided
6. If students live away from home, regular and adequate supervision is provided for boarding and rooming facilities
7. The institution provides a health service suitable to the needs of the students
8. The athletic program is under control of an academic faculty committee. It meets the prescribed standards of the athletic conference in which the institution holds membership

## LIBRARY

1. The library is housed and completely equipped in an attractive manner
2. There is sufficient seating space to accommodate approximately 20 per cent of the full-time enrollment
3. Books are selected with direct reference to the courses offered by the institution. There are at least 4,000 such volumes
4. Sufficient newspapers, periodicals, bulletins, encyclopedias, general reference books, standard dictionaries, and similar materials are provided
5. The library is administered by a librarian who holds a degree in library science. Additional assistants are provided as required to operate the library at all times when students need to use it
6. The librarian has current records showing accessions, use of the library by faculty and students, needed acquisitions, financial matters, and inventories
7. There is maintained a professional library of current materials for faculty use
8. Annual appropriations are made sufficient to keep the library current in its holdings and functional with regard to the curriculums offered. Not less than \$3 per student per year, with a minimum expenditure of \$500 regardless of enrollment, is appropriated for this purpose

## LABORATORIES

1. The laboratories for science and for vocational and semi-professional courses, as well as the rooms or buildings used for fine arts, are attractive and modern and are equipped completely for practice in the field
2. Each laboratory is equipped for individual practice in the field
3. Vocational shops are equipped with work stations equal at least to 90 per cent of the class enrollment
4. Materials and equipment are kept modern and current by adequate, annual appropriations for this purpose

## PHYSICAL PLANT

1. The physical plant is arranged with regard to the specific activities of a junior college
2. The campus is of sufficient size
3. Buildings are modern, or if of older construction, they have been modernized
4. Buildings are of reasonably permanent construction and are kept in a good state of repair
5. Classrooms are well lighted, heated, ventilated and otherwise attractive



PHYSICAL PLANT (Cont'd)	APPROVED	DEFICIENT
6. Equipment in classrooms, offices, special rooms, and throughout the buildings is functional, of reasonably modern type, and is well maintained	_____	_____
7. Business, administrative, faculty, service, and other offices are conveniently located for accessibility to the public, the faculty, and the students	_____	_____
8. Special rooms and facilities are provided as needed by the program of the institution including cafeteria, lounges, dormitories, auditorium, gymnasium, parking	_____	_____
9. Adequate protection for personnel and property is provided against fire	_____	_____
10. Adequate maintenance personnel is employed and proper appropriations made so that the buildings are kept in a clean and attractive condition	_____	_____
FINANCE		
1. The institution operates on a budget which is prepared in accordance with recognized financial and educational practice	_____	_____
2. There is an annual audit by a certified public accountant	_____	_____
3. All business administration is centralized under one business officer who is especially trained for this work	_____	_____
4. The business officer is subordinate to and responsible to the president or other administrative head of the college	_____	_____
5. Financial accounting and records are complete and accessible; funds are properly safeguarded	_____	_____
6. Requisitions, procedure, purchasing, delivery of supplies, inventories, and other business matters are routinized	_____	_____
7. There is a sufficient income from all sources to operate the college adequately without incurring continual financial deficits. This means that there is a stable income from all sources amounting at least to \$250 per full-time student annually for operating purposes only. This excludes such items as capital outlay, debt service, boarding and housing, student aid, scholarships, extracurricular activities, and similar items**	_____	_____
RECORDS		
1. The academic, personnel, health, activity, scholastic, and other student records are filed systematically and protected from loss	_____	_____
2. The registrar keeps complete current records of admissions, enrollment, attendance, scholarships, transfers, transcripts, graduates, and other essential data	_____	_____
3. Individual records are kept for each faculty member showing years of service, promotions, salary, evidences of professional growth, training, experience, noteworthy achievements, and other pertinent data	_____	_____
4. Complete property records are kept by the business office giving details concerning property owned, its acquisition, cost, improvements, insurance, repairs, deeds, abstracts, plat and architectural plan, campus layout, heating and lighting system, and other details	_____	_____
GENERAL TONE AND STABILITY		
1. The general tone and atmosphere of the institution, the truthfulness of its publications, its ethics, and its standing in the educational world are such to recommend it	_____	_____
2. The institution gives evidence of stability in that its clientele, its faculty, and its students all reflect an attitude of confidence in it and pride in its achievements and possibilities	_____	_____

\*\*Reynolds reports (1949) that studies indicate at least \$300 per student per year is required for this item. J. W. Reynolds, "When to Build a Community College," The School Executive, December, 1949, page 51.

# WHAT THE CHAIRMAN OF A SCIENCE BUILDING PROJECT SHOULD KNOW

By HAROLD MAURER

Department of Physics, University of Cincinnati, Ohio

THE reader is to assume that he has just been appointed chairman of a new physics building project. Standing committees of the university have already dictated the site, architecture, and shape to be used for the new building.

Beginning with the top floor, a trap door and an iron ladder are not satisfactory as access to the roof. A standard stairway and door should be installed, because several years after the building has been completed someone might wish to perform an experiment on atmospheric electricity or radio which would involve carrying a delicate or bulky instrument to the roof.

A small stock room on the fourth floor serves laboratory Room No. 410 located above Room No. 307 (see floor plan). This room has no window or other means of ventilation. Although the matter is not serious, this situation should always be avoided. An odd space of this kind can best be utilized for a dark room, such as photometer booths.

## Telephones and Elevators

Offices should be grouped so that one house telephone in an anteroom can serve them all. In fact, the proper way to handle the house telephone problem is to use a conduit at least 50 per cent larger than immediate needs call for and run it the full length of the hall on every floor with frequent tees for tap-offs. Then any time more telephones are needed, additional lines can be added.



HAROLD MAURER

The five elementary laboratories on the top floor have a stock room between each pair. The elevator services one stock room, the lecture apparatus room on the third floor, the stock room on the second floor, and the shipping room on the first floor. The elevator cab interior is six and one-half feet square and has a capacity of 3000 pounds. It operates at 70 feet per minute. This

speed could have been increased at least 50 per cent. If an attic is in the plans, include a penthouse on the roof so that this space is serviced by the elevator even though not used now.

## General Layout

The third floor plan represents the general scheme of the entire building. Plan A shows the way it is today and Plan B represents one of the recommended changes.

Room No. 306 now faces north, but should face east because:

1. Students must enter and leave by the same double door.

2. The aisle is only partially around the room and half the people who come late or wish to leave early must walk in front of the speaker.

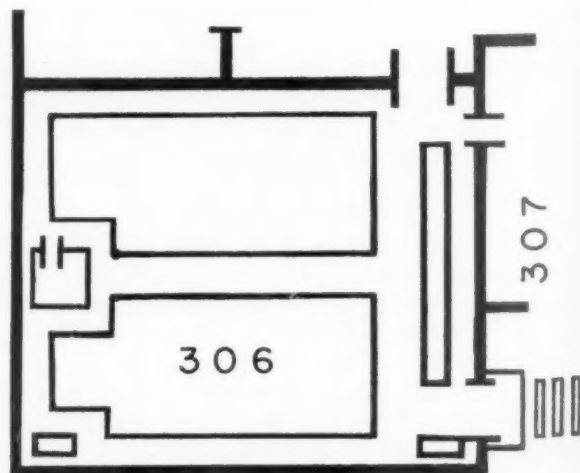
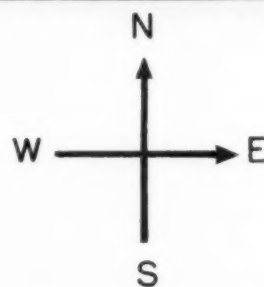
3. With only one exit on the same side as the preparation room (an emergency exit), the students



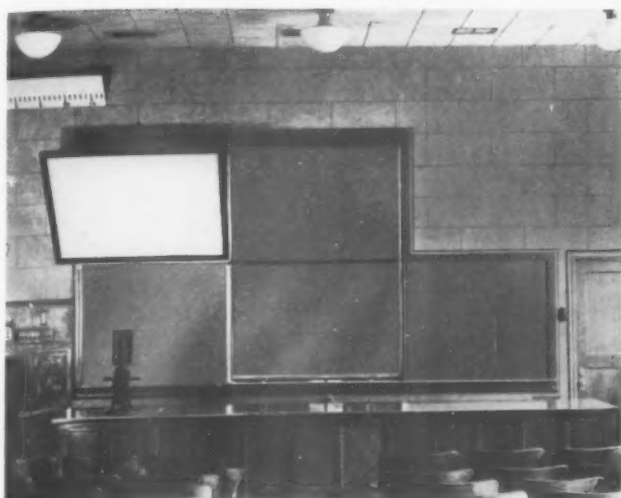
Front view of the T-shaped physics laboratory building at the University of Cincinnati, above, as it appeared when it was completed in 1935. Plan B at right shows one of the recommended changes from the original layout. Rearrangement of desks leaves aisle around entire room.



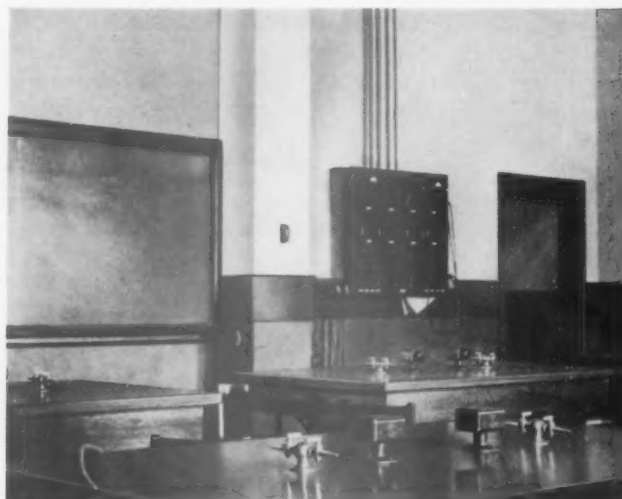
Rear view of the building (north).







Lecture room.



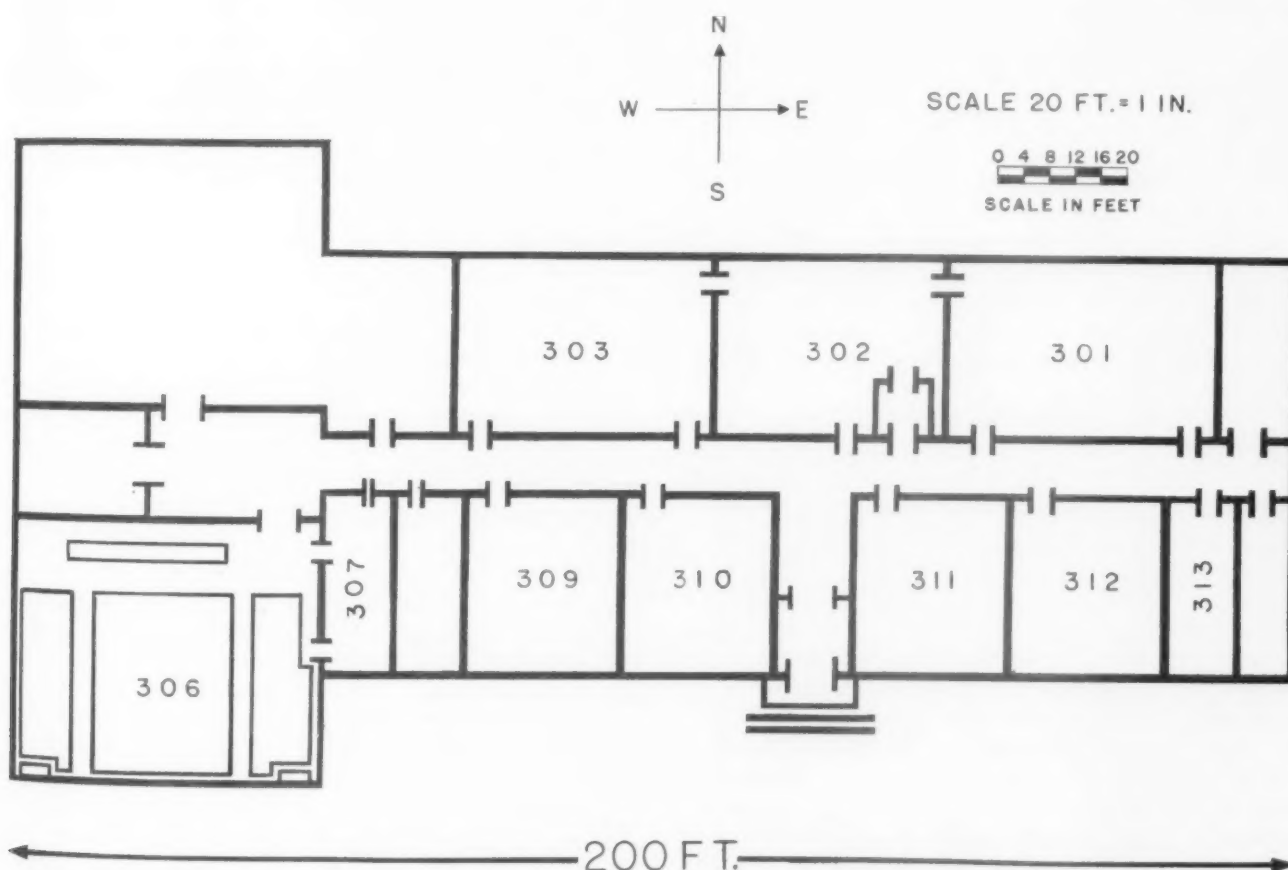
Elementary laboratory.

walk between the lecturer and his equipment. There are sometimes but ten minutes between a change of classes and the demonstrations. With a capacity of 219 seats in a room, this is not a small matter.

One reason for orienting Room No. 306 as shown on Plan A was to enable the students to be as close to the lecture table as possible, especially for small lecture demonstrations. Lecture room seats with

hinged tablet arms also help and save space. Nevertheless, when the lecturer faces a room broadside, some students will have a poor view of the lecture table.

Lecture Rooms Nos. 301, 303, and 306 have five switches for five rows of lights on each side of the room. A master switch to operate all lights could have been added. A dimming control and projection



Plan A of third floor is typical of other floors.

booth for Room No. 306 would be very desirable.

The electrical power board is in the basement across from the elevator, and the main distribution board is on the second floor near the elevator. In addition, sub-distribution boards (multi-voltage) are in all five laboratories on the fourth floor. All this is excellent, but be sure that all laboratories and lecture apparatus rooms have sub-distribution boards.

#### Chief Clerk's Office

The chief clerk's office, Room No. 313, should be next to the entrance across from the elevator because:

1. The elevator would be more accessible. This is essential for a man who might be called to any place in the building at any time.

2. At present the door to Lecture Room No. 311 is just opposite the elevator door. Extraneous noise in a lecture room is to be reckoned with.

3. Fuse panels in lecture rooms should be avoided because if a fuse blows, one must disturb the class. Panels should be in the office of the chief clerk.

In a concrete and steel building acoustic treatment is a necessity. All lecture rooms have acoustically treated ceilings and side walls to within six feet of the floor. If there is a choice between the side walls of the lecture rooms or the hall, treat the hall. Echoes can be terrific, undoing some anti-noise efforts in the lecture rooms. Instead of wood floors with mastic, investigate other possibilities.\*

#### Tiled Hallways

In the third and fourth floor halls and all stairways tile is installed up to a height of five feet. Years later this tile will look as impressive as the day it was set. The only attention this material requires is to be sponged down with warm water and soap. Janitors, too, appreciate ideas of this kind.

The second floor storage room, approximately under Room No. 304, measures about 15 feet by 20 feet. No part of it touches an outside wall, which makes it an ideal room for experiments requiring constant temperature.

In a building without an attic to store equipment

temporarily out of use there should be a storage room 25 feet by 35 feet near the elevator. All four walls should be lined with 18-inch shelving to keep the center of the floor clear for bulky items.

A very desirable feature in a storage battery room is a cesspool, so that if acid is spilled it can readily be disposed of by flushing.

Janitorial headquarters are on the first floor approximately under Room No. 307. They should be next to the shipping room and actual experience has proved that ample janitorial space is as important on one floor as another.

Efforts to add massive beauty to an otherwise plain building should be avoided.

The fundamental services in a science building are electricity, water, gas and, possibly, compressed air. Do not leave these items out of any room merely because they are not required at the moment. A degree of versatility should be planned.

#### Caution in Ventilation

Ventilation is not only costly but tricky. One type of ventilating equipment is a large fan that services the two lower floors on the windowless south side of the building. The other is individual unit-vents for laboratories and lecture rooms. Merely to install a unit-vent in a room is not satisfactory because:

1. The first thing a student does is put his hat and coat on it.

2. It is false economy to have two blasts of air from a few unit-vents in the rear of a lecture room.

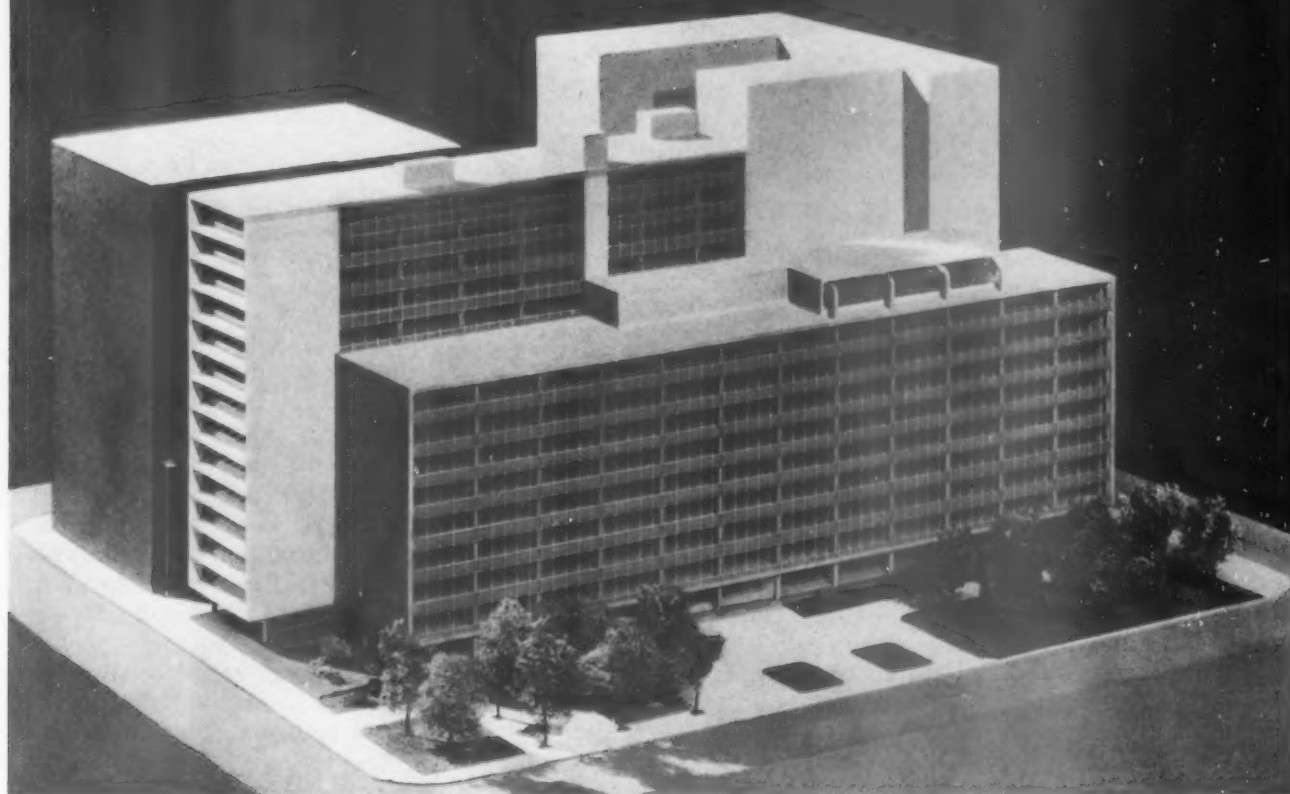
The air should be directed to the ceiling and sprayed about the room from multiple openings with vanes in the duct so that one can adjust the amount of air coming out of each opening. Unit-vents with three speed switches are excellent provided this control switch is at the lecture table and not inside the unit-vent. Any exhaust or intake hood should have a weather vane and revolve so that it always faces away from the wind.

Steel casement windows should be the type that can be weather-stripped.

The services of a good architect are something that can be appreciated beyond monetary value. Crowe and Schulte of Cincinnati were our architects, and they left nothing to be desired.

\* See pages 385-388 of the 1949-50 edition of THE AMERICAN SCHOOL AND UNIVERSITY.

# CLEVELAND COLLEGE



## DOWNTOWN CENTER FOR WESTERN RESERVE UNIVERSITY

By NEWELL LANDES

**P**LANs FOR the new one-structure plant for Cleveland College stress flexibility and informality in view of its varied program for now and the future. As the downtown center of Western Reserve University, the college attracts a great variety of students. Recent high school graduates and adults come as regular undergraduate students and as part-time degree candidates to the School of Arts and Sciences and School of Business Administration. Adults enroll for continuing education, including lectures, forums, and discussion groups, in the School of General Studies.

The college extends its services to the community beyond the purely academic through the services of such special agencies as the Personnel Research Institute, the Bureau of Business Research, and the

Reading Improvement Service. The building is also used by many community groups.

In addition to technically advanced answers to such problems as lighting, air-conditioning, acoustics, maintenance, and structure, the building incorporates the following features.

### Expression of College's Philosophy

To be most effective, the college plant must be specifically designed from the outset to further the kinds of experiences the college is trying to create for its students. As a person's home is expressive of his personality and way of life, so the physical environment of a college is equally important in expressing and carrying out the philosophy of the institution.

Cleveland College encourages a close student-faculty



relationship and the integration of the academic, social, and vocational development of its students. A college that promotes this erasing of lines between various learning experiences should plan a helpful building that avoids monumentality and an "institutional" feeling. Such an informal setting enhances the carry-over between classroom and other activities.

Because a college with vitality constantly experiments with techniques for improving educational processes, its physical plant must be adaptable to housing many unpredictable new activities and modifications of current activities. Surveys and estimates of future conditions are necessary and useful, but experience indicates their fallibility. Consequently a building will live longer if its space is consciously planned for freedom in change of use rather than for only those activities that are now in operation.

Certain limitations to complete flexibility exist. The ideal situation would be to achieve wholly uninterrupted spaces which could be subdivided at will according to the changing needs of the college program. But some elements of the building, which are permanent installations by nature, restrict this ideal. First is the structure itself. This has been confined to the simplest and most unobtrusive terms—floor slabs and columns with no bearing walls. Stairs, elevators, escalators, toilets and mechanical equipment spaces must also be considered fixed because of the expense and structural difficulties involved in changing them. Then the state and city building codes require certain inflexible fire protection measures.

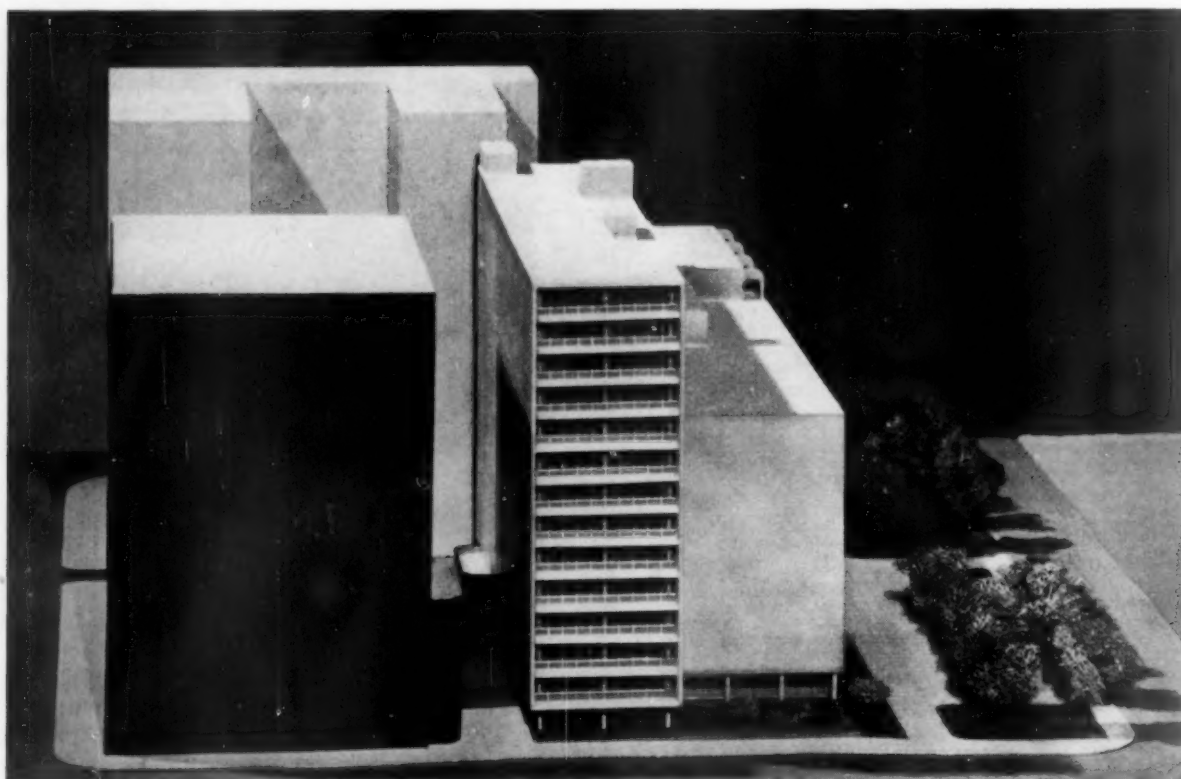
After these fixed elements have been assigned, attention turns to the type of flexibility needed in the remaining space. There are really two possible kinds: space designed to accommodate multiple uses; and whole areas designed to facilitate reshuffling of room sizes and shapes. In studying our requirements for the latter kind, we have concluded that they do not point to the necessity of having partitions that can be moved at very frequent intervals. Room sizes need to be shifted only every few years.

#### Coordination of Building and Environment

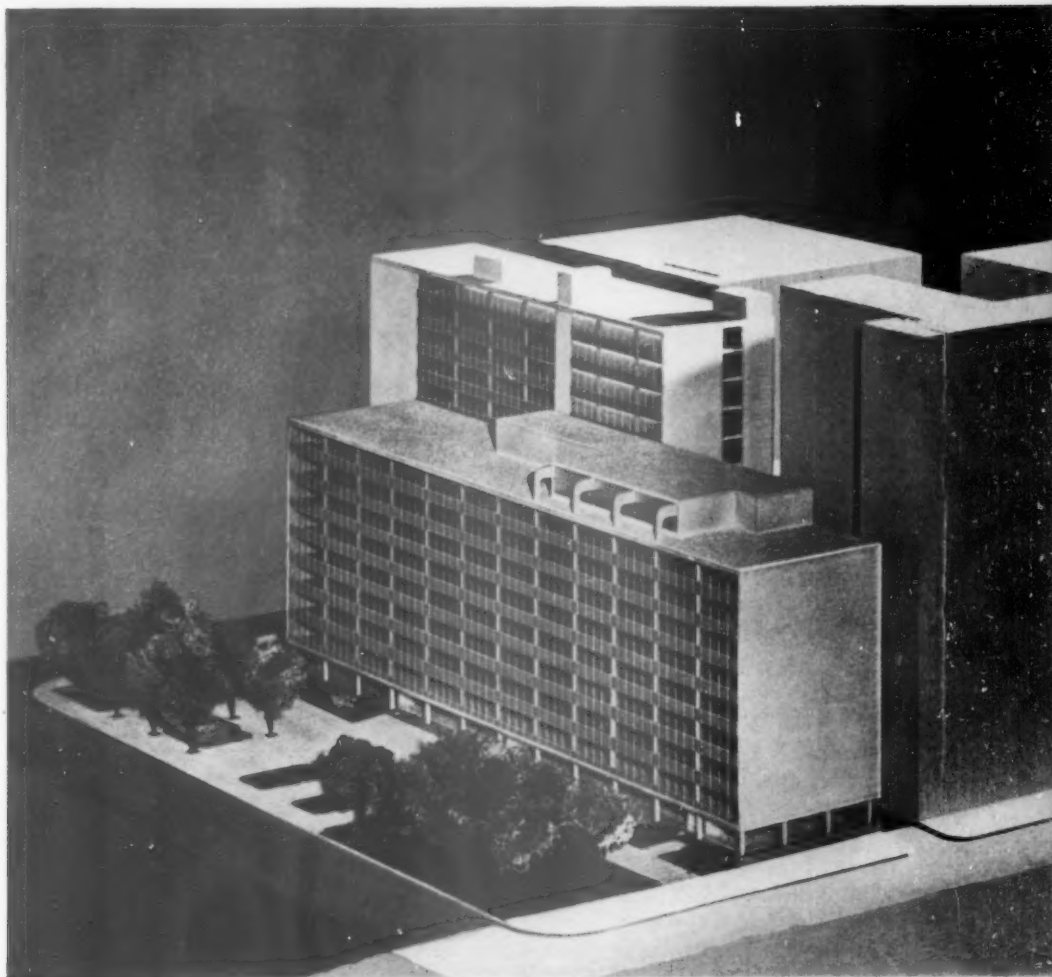
The site is at a corner with one side facing the Public Square, commercial hub of downtown Cleveland, and the other longer side facing the Mall, a large park lined on two sides by public buildings in the classical tradition. Although the college cannot imitate the architectural style of these buildings and still achieve a functional educational plant, it is responsible as an institution and a good citizen for considering the new building in relation to its environment.

Most campus colleges now have "campus plans" and the urban college must develop its equivalent in the form of a logical vertical expression of its organization and program. We have found that this means coordinating the type of thinking that goes into planning the modern office building with the planning for educational functions.

Just as the campus college completes its campus plan piece by piece, so the Cleveland College building, although eventually to be one unified structure, must



No "campus plan" for Cleveland College, its urban location requires vertical expression. The main wing of nine floors will be the same height as the Mall buildings which it faces. The tower of thirteen floors facing the Public Square will follow the height of buildings on the Square. Photos of the scale model show the college in its completion.



be capable of construction by easy stages. Each stage must be financially and structurally sound. Each one, as well as the completed plant, must offer the college a logical plant in which to operate.

#### The Outside Corridor

The outside corridor concept is a shorthand description for the building originally visualized on the basis of its requirements. It had an internal core of work-space; i.e., classrooms, laboratories, and workshops, with a corridor around the perimeter of the building. On the side of the building overlooking the Mall, the corridor was wide enough to serve as a lounge and meeting place for the students and faculty using the classrooms.

Especially since the majority of our classes and other activities are conducted after dark, it was felt that the lack of natural lighting in offices and classrooms was not a loss but actually a gain in that it permitted complete control of environment for the offices and classrooms by eliminating the effect of outside variations in light, temperature, and sound. And the peripheral space was put to its best possible use

in taking advantage of the panorama of the Mall.

The working core was surrounded by permanent walls required by the building code, but within those walls we were free to place partitions wherever we needed them and to change them at will.

Although the final building would have been ideal, analysis of this plan showed that its stage by stage development was not practical. Because of the size and shape of our land and other conditions beyond our control, the construction of the first stage, about 90,000 square feet, would have yielded only 16,000 square feet of working space. This was partly due to the necessity of including in this stage all the sanitary facilities, elevators, and escalators, and much of the horizontal circulation space, for the final building.

#### Adaptations Made

The present scheme is the result of trying to overcome the difficulty inherent in the outside corridor plant when applied to our particular site. It does so by its extreme simplicity and straightforwardness that permit a larger proportion of working space to gross area than was possible with the outside corridor

plan and consequently a satisfactory stage by stage construction.

Basically it consists of two strips of space with a clear width of 24 feet by 6 inches running for 320 feet and separated by a standard 8 foot by 6 inch corridor. Centrally located inside are the vertical circulations and the toilets which run straight up through the building. Alongside this structure on the ground floor are three sloping floor lecture rooms. Above these an additional structure 50 feet wide and 215 feet long will finally be built.

In order to relate this new building to its surroundings, the main wing of nine floors, which faces the Mall, will be the same height as the Mall buildings. The final tower stage of thirteen floors above the lecture rooms will face the Public Square and will follow the height of the buildings on the Square. We feel that the clean lines of a contemporary building with its masses coordinated with the skyline of the Mall and the Public Square will provide a welcome backdrop to the monumentality of existing buildings and will aid in the current rethinking of the visual concept of the Mall.

At the corner where the Mall and the Public Square intersect, we have set the building back about 35 feet. Our aim is to relieve the present feeling of constriction at this point by opening a vista between these two large open spaces.

Flexibility is maintained throughout. By locating as many of the fixed elements as possible in a central core, the remaining space is left in large uninterrupted blocks. Again, the corridor walls must be permanent, but between these and the exterior of the building, partitions can be placed on any 5 foot-2 inch module. This means that classrooms, for instance, can range in size from 500 square feet to 875 square feet at increments of 125 square feet.

#### Vertical Plan

The vertical organization for this plan is much the same as that which had been worked out for the outside corridor scheme. The ground floor provides en-

trance lobby and lounge space adjacent to the large lecture rooms and the vertical circulations. Behind these are most of the administrative offices which deal with students and the public—admissions office, registrar, recorder, and cashier—and the public relations department and mailing room which require a close tie with the loading docks.

The second through seventh floors are devoted to classroom space. Here are all the general class and seminar rooms, and at the ends of each floor, the laboratories and workshops for such special activities as physics and psychology, sculpture and weaving. Adjacent to these special purpose rooms are the offices of the faculty members who teach in them. One floor will also serve as our general education center and will incorporate such facilities as conference rooms for community groups and a pamphlet shop.

Centrally located near the elevators and escalators on each of these floors is lounge space. We hope that this, combined with a low ceiling height of 9 feet-6 inches throughout the building, will help to create the informal atmosphere we feel is desirable.

The library will be on the eighth floor. It has been designed in an alcove system with no closed stacks. This brings the reader close to the books in a residential-scale setting. Prints, phonograph records, and other audio-visual aids are centered on this floor.

The ninth floor is our student union. The cafeteria and kitchen, a large lounge, game and club rooms, and spaces for student activities are found here. Additionally there is a large open area with a high ceiling, which can be utilized as a gymnasium, a ballroom, and an arena theater.

The tenth through fourteenth floors accommodate the offices and lounge space for the faculty and deans, as well as space for their clerical workers. Here also will be offices for the several community services such as the Personnel Research Institute. Each of these floors is about one-third the area of a typical floor below.

The basement houses the usual storage, maintenance, and mechanical equipment space.





## COLLEGE AND UNIVERSITY LIBRARY BUILDINGS

DANIEL PAUL HIGGINS

Eggers and Higgins, Architects, New York City -

**W**ITHIN recent years, a revolution has taken place in the planning of college and university library buildings. Revolutions are not necessarily accompanied by violence, nor need they occur overnight. Their origins may be obscure and buried deep in the past. There may be numerous contributory factors in their development. And finally, the evidence of the revolution itself may be quiet, almost imperceptible. As far as college and university library buildings are concerned, the revolution has been a long time coming, but it is definitely in process.

The postwar years have already brought better library buildings. The new ones are good—in most cases, far superior to their predecessors—and in a few cases they are extraordinarily good.

Not the least important cause of change is the unmistakable fact that the college library has come to be recognized as a vital instrument of education. The cobweb version of the library is gone forever. One does not have to look far to find some of the impulses that thrust the library into a conspicuous position in the educational picture. Dramatic changes in approaches to almost every field of education, including



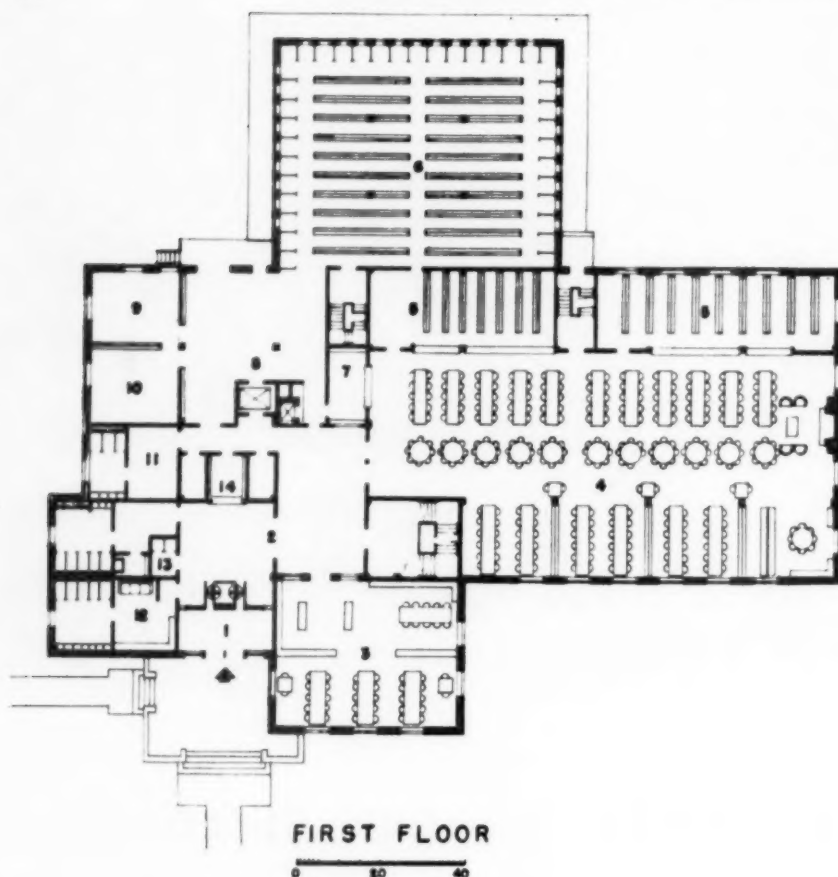
Daniel Paul Higgins, who received his education at New York University, has been an architect since 1905. He is a member of the American Institute of Architects and of the Architectural League, and was Treasurer of both organizations for three years. He was formerly chairman of the Building and Sites Committee of the Board of Education of New York City. Mr. Higgins has also contributed much to the field of architectural literature.

social as well as physical sciences, were bound to have their impact on the library.

### Group Thinking Brings Progress

Group thinking on college library problems has within a relatively few years crystallized what so many had been dreaming and hoping for decades. College and university authorities, librarians, architects and others concerned have joined hands, dug deeply into mutual problems, examined traditions with new eyes, and agreed on new avenues to the solution of many long neglected questions.

Any attempt to appraise the current library building scene without reference to the thinking of the last

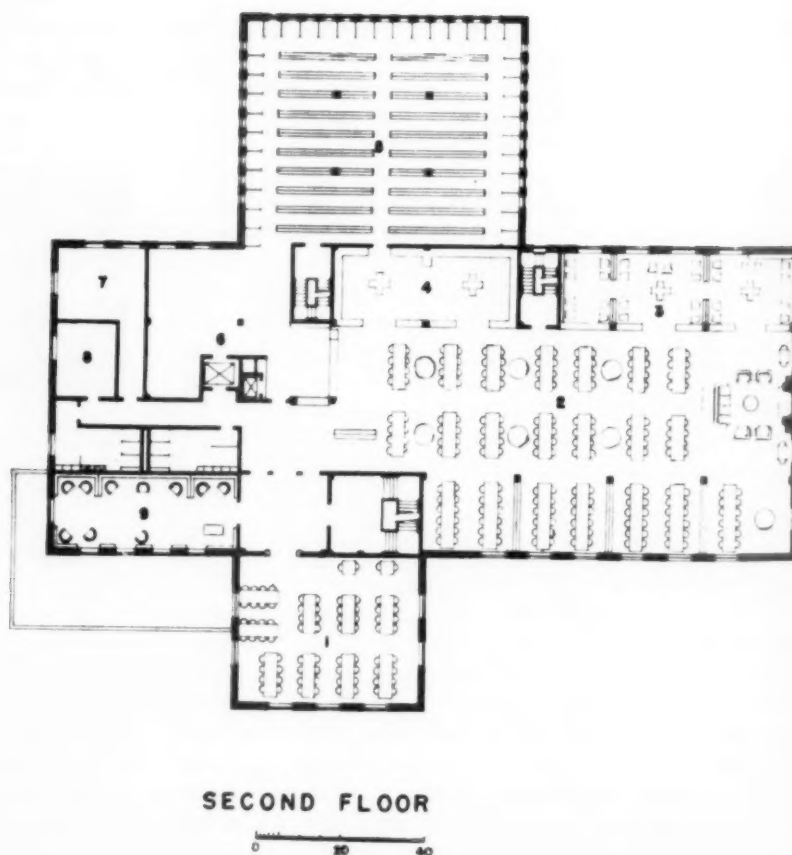


In these three floor plans of the library at the North Carolina Agricultural and Technical College at Greensboro, the main unit and its wings are easily identified. Some of the facilities on this floor are:

1. Vestibule
2. Lobby
3. Periodicals and Documents
4. Reserve book reading room
5. Reserve book stacks
6. Book stacks
7. Reference library
8. Receiving
9. Work space
10. Storage
11. Restroom
12. Powder room
13. Telephones
14. Desk

Besides staff and library offices, the second floor includes a special collection room and a small reading room where smoking is permitted. Flexibility is emphasized throughout the building. In all reading rooms, books are handy on open, movable shelves.

1. Periodicals
2. Main reading room
3. Reading
4. Bibliography and card catalogs
5. Book stacks
6. Work space
7. Staff
8. Librarian
9. Special collection



few years and of today can have little meaning, for it will fail to reflect the imprint of unprecedented cooperative thought on the planning of the buildings already erected, or those to come in the near future.

#### Signs on the Horizon

The far-seeing planner might have detected rumblings back in 1932 when James T. Gerould's *College Library Building* came upon a relatively quiet scene. The literature, mostly in periodicals, pointed toward such questions as what a college library was supposed to do, how a building should be designed to do it, and why it was not always being done. Following the reprint of this book in 1938 by the American Library Association, this organization published Edna Ruth Hanly's *College and University Library Buildings* in 1939.

THE AMERICAN SCHOOL AND UNIVERSITY was alive to the trend in 1941 when it published Frank K. Walter's analysis of the college library panorama. Walter approached his subject with perhaps more caution than the facts might then have seemed to warrant. He pointed ahead with accuracy when he wrote:

"The increase of interest in research with the consequent widening of the curriculum has multiplied the fields and specific subjects on which the library must furnish material and has made systematic provision for increased book storage uncertain in any growing institution."

Much of the literature that followed pointed toward a new significance of the college library and hinted, where it did not actually say it, that this would demand new concepts concerning its design. In her illuminating book, Edna Ruth Hanley set forth basic principles for college library planning. But we find that the whole question had not yet won the attention it deserved, for Miss Hanley, in the December 15, 1945, *Library Journal* returned to her theme with renewed vigor.

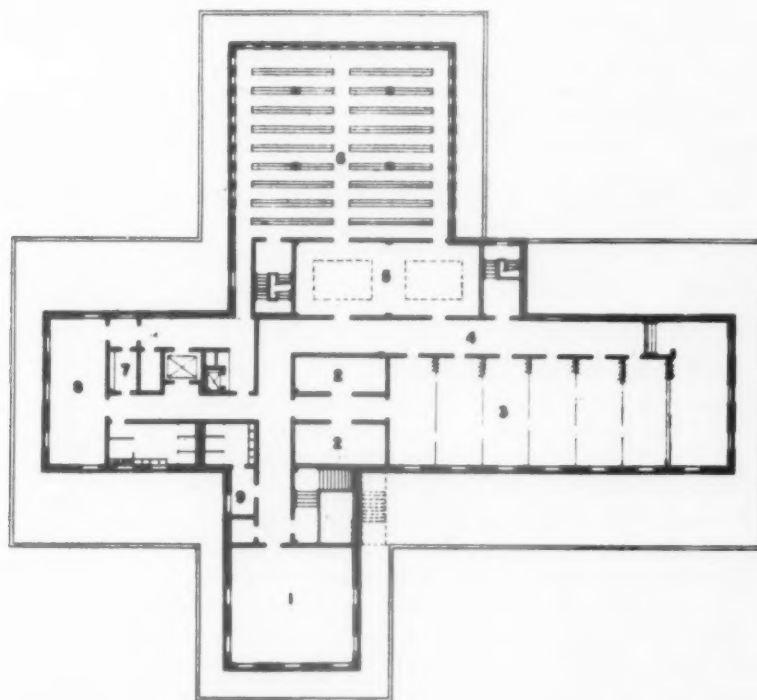
Although these fundamentals have been set down time and again—and in the process finally won attention and recognition—Miss Hanley's synthesis of the then current view still holds:

"Regardless of the amount of money available for the building and the type of architecture which may have to be used to conform to existing situations on the campus, the following fundamentals are of primary importance and must receive basic consideration. The function of a college library is to service a book collection supplementing the institutional program of the college or, as it is sometimes stated, to bring books and students together in the most effective manner. This necessitates on the part of those planning the building a thorough knowledge of the formalized curriculum, the educational theory of the college and the needs of the student body as a whole. The library requires a specialized type of building, its character varying according to the educational program. . . . Every library building must be planned for the future as well as for immediate use."

In all planning, she said, the potentiality of rearrangement must dominate:

Faculty, staff, and graduate students are exclusive users of the third floor. Kitchen facilities and storage space are supplied. This floor is set back from the rest of the building, but receives a great deal of light, as do all floors because of the core and radiating wings.

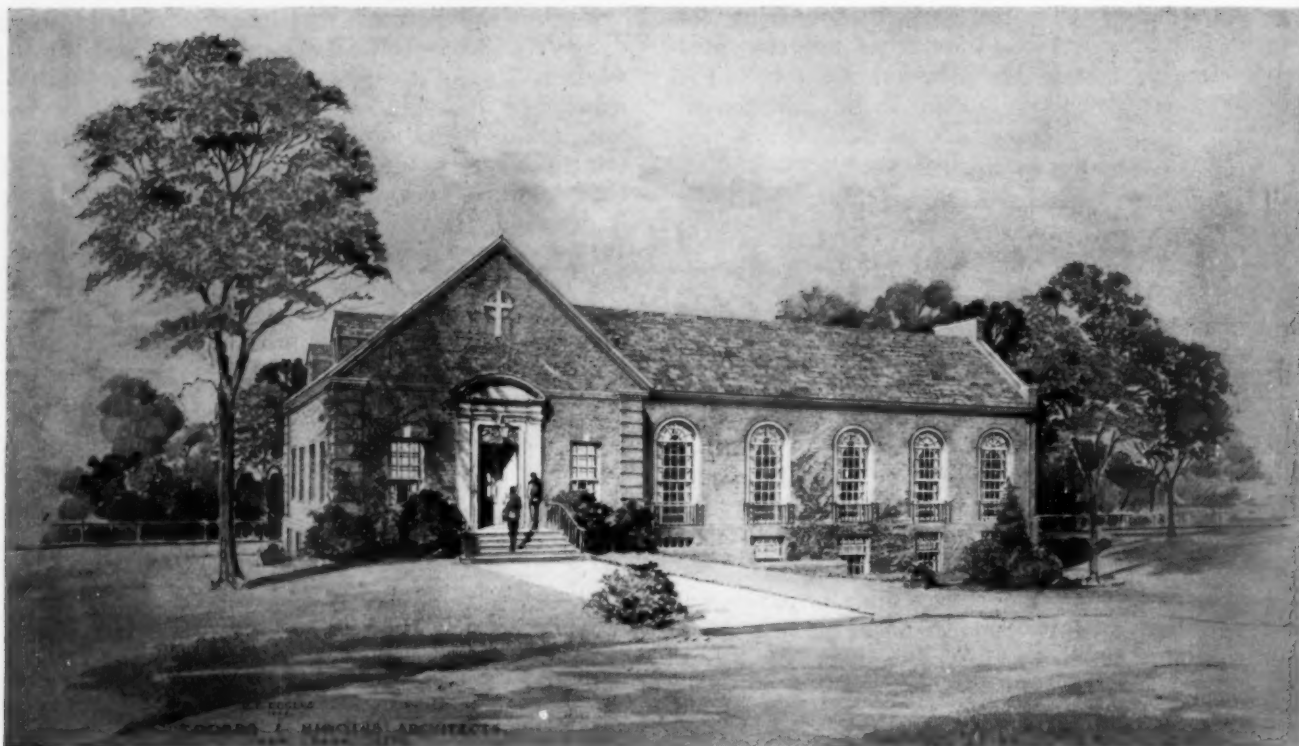
1. Graduate study room
2. Audio-visual
3. Seminar rooms
4. Corridor
5. Faculty studies and special research
6. Book stacks
7. Kitchen
8. Faculty reading room
9. Restroom



THIRD FLOOR







A plan for controlled growth demanded special consideration in plans for the library at Iona College, New Rochelle, New York. Architects took advantage of the terrain and built an entrance on each level. One good reason why libraries should be designed individually is to suit appropriate needs of the college within finances and style.

"Educational methods are not static; since the library is so intimately connected with the institutional program, it is imperative that it be sensitive to any demands which may be imposed upon it through changes in the educational program of the college. These changes may be so radical as to necessitate a complete rearrangement of services and disposition of space."

The intervention of World War II may have retarded progress in library planning, but the end of the war certainly brought unprecedented, concerted activity.

#### Vital Developments of Last Five Years

Four developments since the war seem of great significance in the shaping of present and future buildings. They are the work of the College and University Post War Committee of the American Library Association and the Association of College and Reference Libraries; the studies of the American Institute of Architects; the accomplishments of the Cooperative Committee on Library Building Plans; and the Library Institute of the University of Chicago (1946).

Together, these joint ventures have staked out fundamentals which will directly influence all college library planning and will stimulate additional similar ventures. These cooperative activities are the quiet revolution that has inspired modern college library planning. There have been and continue to be many by-products of these conferences, with their resultant literature, and the force of their work provides an

invaluable basis for improvements in college library buildings.

The Cooperative Committee on Library Building Plans gave most effective voice, not alone to the cumulative thought of recent years, but indeed to the cries in the wilderness of fifty years ago.<sup>1</sup> The committee was organized in 1944 at the call of President Harold W. Dodds of Princeton University. The group held five principal meetings and its wide and experienced membership collaborated on a canvass of views and experience rarely, if ever, paralleled in the college library field. The product of its work is epitomized in *Planning the University Library Building*, published in 1949 by the Princeton University Press.

Sponsored by university presidents, the committee included librarians for the most part, but received the full cooperation of architects, engineers, and others. Recognizing the infinite potential variations in college library planning, Julian P. Boyd, in his foreword, observes that "... no honest report could really arrive at dogmatic conclusions, and the reader who seeks in this monograph unequivocal and precise instructions as to how to solve his own problems is foredoomed to disappointment."

Although Mr. Boyd modestly concludes that the book "should provide a reasonably complete checklist

<sup>1</sup> *Planning the University Library Building*, edited by John E. Burchard, Charles W. David, and Julian P. Boyd, Princeton University Press, 1949.

of the [library planning] matters to be considered," it accomplishes a great deal more than that. One of its important contributions is to draw together the best thinking on the subject and to give effective expression to it. It therefore lays the bases for important points of understanding and agreement among all who will be confronted with library planning problems. The value of this contribution to mutual understanding can hardly be overemphasized.

#### Library Objectives

Since the objectives of a college library constitute the beginning point for all planners, the American Library Association Committee set out to state what these objectives might be. After first analyzing the objectives of colleges themselves, the committee developed a set of criteria for their libraries. The college library aims:

"1. To enable and encourage a student to form the habit of self-education during his college days; to enable him to familiarize himself with the various types of books which will contribute to his intellectual development in future years.

"2. To enable each faculty member and graduate student to familiarize himself with the various bibliographies and reference tools which will aid him in his research and instructional activities; to make it possible for him to keep abreast of the most recent developments in his major and minor fields, including instructional methods; to assist faculty members in their attempts to organize their courses and methodology so that they may render the greatest possible contribution to the attainment of college objectives.

"After these two statements are prepared, then the librarian and his staff, after studies of the use and book needs of the faculty and students, may well prepare a list of detailed and specific objectives which the library staff may hope to attain. The following statements may be suggested:

"1. To enable each student and faculty member through personal assistance to locate material which can be found through periodical indexes, bibliographies, reference books and card catalogs. The ultimate goal will be the development of the ability in each patron to locate the material for himself without personal assistance.

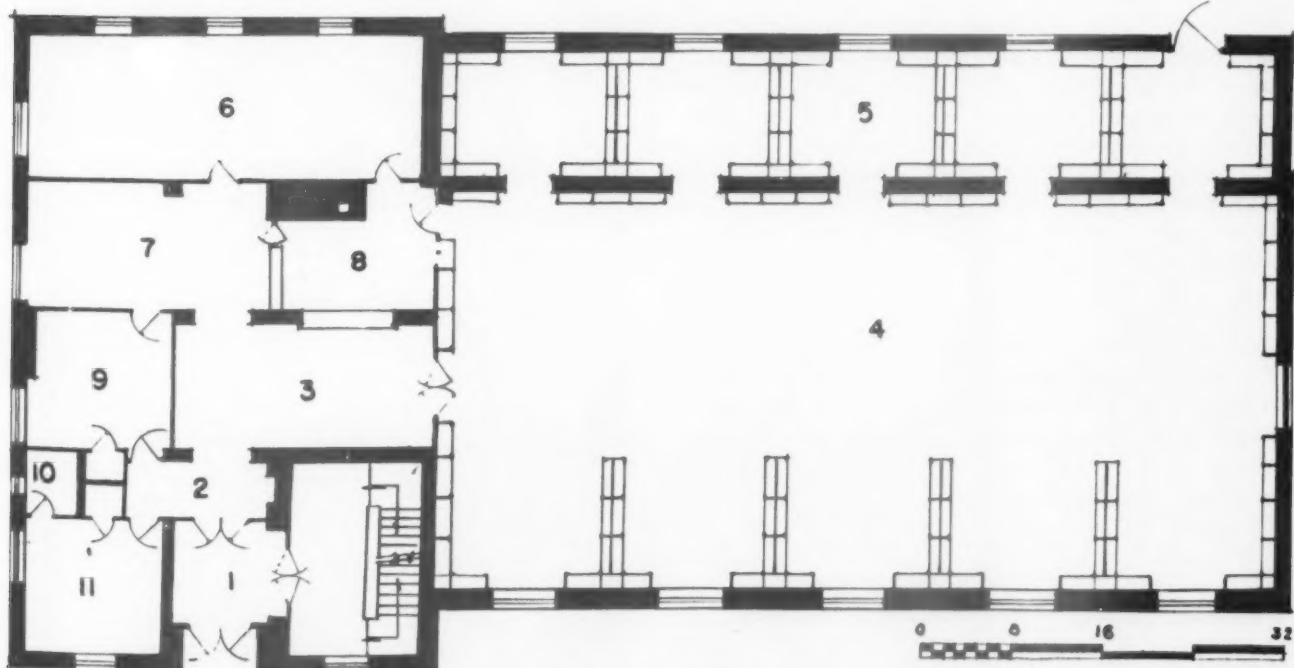
"2. To enable each patron to discuss book needs with experts in subject fields and to obtain adequate suggestions for reading and research.

"3. To bring about an understanding by each faculty member and student of the assistance a library can render in self-education, in instruction, and in research.

"4. To make it possible for each student and faculty member to examine easily all available publications in the various disciplines in which he may be interested.

"5. To deliver promptly every book needed and requested by a patron. (A time allowance of three or four minutes might well be the goal.)

"6. To make available to each research worker any books he may need whether such books are in the library or not; to supply information to faculty members and research workers on the location of exhaustive collections in other libraries which they may desire to examine.



First Floor Plan, Iona College Library.

1. Entry, 2. Hall, 3. Lobby, 4. Reading room, 5. Alcoves, 6. Cataloging and working space, 7. Catalogs, 8. Control room, 9. Secretary, 10. Toilet, 11. Librarian

"An analysis of the application of these objectives will reveal that a very different library service will be required than at present exists. It is also apparent that new needs of faculties and students will require a wider application of objectives. Addition of new services as well as the expansion of old will be emphasized by new needs of a library's clientele in the post-war future."<sup>2</sup>

Pointing to the vast areas of expansion in the future, the committee gave only two examples:

"The attainment of the first general objective will require much more frequent contacts between the students and books. . . . These connecting links may be formed by faculty members or by library specialists, or more probably, both.

"Changes in the location and arrangement of books will be necessary. Classroom and laboratory libraries may be much more in evidence. Considerable collections of books will be lent for office, classroom and laboratory use by instructors and students. Another solution will be to organize classroom collections in the library with subject matter specialists available to assist students in learning through reading. . . . The collections should be fluid."

There is an abundance of material on the objectives of the college library. Scarcely a group working in the field has failed to touch the subject. All agree that while there are basic principles among these objectives, the realization of them will differ from college to college.

#### Library Program

*Program* is to planning what specification is to purchasing. The program is the statement of what the institution needs. The purchasing specification is designed to state what the buyer wants.

"The program should show with precision the purpose, unity, coherence, and emphasis intended in the plan of the library's service."<sup>3</sup> It must be written around the specific requirements of the college, in the light of its objectives, and even then it is subject to the infinite variations that may arise in subsequent conferences and work.

How many such variations are possible may be sensed from one illustration cited by the same committee in its report. The members found that there are three "levels" of library activity which they described as supply, relating to the books; guidance, which they indicate to be the assistance of instructors and librarians; and stimulation, by which they mean methods and steps to attract the reader to the book.

"A library's acceptance or rejection of some or all aspects of stimulation will make a difference in the kind of building it requires. If, for example, a library were to reject this func-

tion in its entirety, presumably no provision would be made for open shelves or for display of any kind. Conversely, if a library were to adopt stimulation by physical arrangement as a major responsibility, careful attention and the best space would be given to open-shelf collections and to facilities for display. A library might accept some, but not all methods of stimulation."<sup>4</sup>

One need hardly explore more deeply to see that "programs" will differ sharply as policies differ among libraries and colleges.

#### Planning Problems

As is the case in all other fields, the emphasis is on what purposes the building will serve. Before exploring the architectural problems that sometimes arise, it is well to ask, "Who decides?" Common practice is to assume only three entities in the cooperative effort to achieve a library building: the building committee or board, by whatever name it exists; the librarian; and the architect. As a practical matter the interested parties may often be more numerous. Certainly the donor may have a view on what he would like in the building. The president of the institution, or one or more of his personal representatives, may participate. Indeed, several persons may be involved besides the central three.

Without any doubt all seek in all sincerity the best possible library for the college. Differences of opinion about what this means may well exist among librarians and educators. But, one of the valuable contri-

<sup>4</sup> *Library Buildings for Library Service*, Chicago University, 1946, p. 21.



<sup>2</sup> Charles H. Brown, *College and University Libraries and Librarianship*, prepared by the College and University Post War Committee of the American Library Association and the Association of College and Reference Libraries, Chicago, 1946. American Library Association, p. xi.

<sup>3</sup> *Library Buildings for Library Service*, Chicago University Institute, 1946, pp. 22-23.



butions these groups make is to pool their knowledge and give currency to their views so that it is easier to reach understanding.

Inevitably, among the questions that arise to perplex architects is that of adjusting differing views to serve all interests as well as possible. Of course the architect cannot achieve that alone. He can, however, make progress through understanding among those with whom he works.

In connection with at least one of these problems, the committee made a highly significant statement:

"One of the most interesting, although unfortunate, features of college and university library architecture is the persistence of the monumental tradition as opposed to the service or functional recommendations of many authorities.

"Two chief reasons for this persistence may be found. First, college and university authorities have often and rightly conceived of the library as the intellectual center of the institution, and have therefore sought to enshrine it in a building of striking architectural effect which, consciously or unconsciously, may serve as the architectural show place of the campus, lending dignity and beauty of the whole.

"A second and perhaps more important reason is that American college and university architecture is nearly always European and often medieval in style. The library must almost necessarily harmonize with the general architectural style of its campus. The result has been that it has often been forced into an ostentatious Procrustean bed, planned and styled to

meet conditions and needs vastly different from those of the modern college or university library.

"Librarians have been too little vocal in protesting this state of affairs and pointing out the costs. With more alertness and courage on their part, and more hard and ingenious work on the part of the architects, reasonably modern and efficient college library plants can be erected within whatever style of architectural outer shell the college may be committed to in its general architectural plans."<sup>5</sup>

In the light of these statements, it is small wonder that architects' work must adjust to many influences.

"To a much greater extent than public libraries, college libraries present individually unique problems. Here, perhaps as much as in any type of structure, the architect must insist upon and aid in the preparation of a careful, comprehensive program. The physical elements and equipment of college libraries do not vary greatly, but there is great variation in program elements such as ratio of general to special collections, accessibility of stacks, spaces in stacks for study, research, classes and seminars, special collections. Other variables are the size and location of reserve book rooms, study halls, faculty offices, in addition to the newer non-book services found in public libraries, such as microfilm, micro-card, music collections. . . ."<sup>6</sup>

We can better understand why Leroy Charles Merritt<sup>7</sup> urged architects to provide fully developed

<sup>5</sup> *College and University Libraries and Librarianship*, A.L.A., 1946, p. 127.

<sup>6</sup> *Bulletin American Institute of Architects*, September, 1947, p. 33.

<sup>7</sup> *Library Buildings for Library Service*, University of Chicago, 1946, pp. 61-70.



Flexibility was achieved in the new library for Iona College in New Rochelle, New York, despite difficulties. Reading alcoves and reading room combined make it possible. Books and periodicals are accessible on open shelves, as seen in the two photographs at left.

schemes for future growth when we comprehend the degree of elasticity that is now expected in college library planning.

"Contemporary library planning places major emphasis on the relation between stack and reading areas. The relation between the stack and the administrative space where technical processes are performed is considered less important than the proximity of the technical processes to each other, to the public catalog and to the trade and general reference books. The emphasis on convenient access to stacks from reading areas stems in large part from a change in the philosophy of book use from a rigid segregation of readers and books, in order to preserve the latter, to a more casual intermingling of readers and books, in order to serve the former better. . . . The recently growing tendency toward making many books easily available to all readers, is forcing an evolution of library design toward buildings with greater interior flexibility. The building is becoming the stack and the stack is becoming the building and within this unified structure all library functions find their proper place, take only as much space as they need, and expand as they grow at widely differing speeds."

#### Librarians Tell What They Need

Robert H. Miller's report of the survey of the Committee on College and University Library Buildings<sup>8</sup> of the Association of College and Reference Libraries contains a wealth of facts for contemplation, not alone by architects, but by building committee members, college presidents, donors and others concerned with this question.

The survey covered 33 responses to questionnaires addressed only to colleges known to have completed new library buildings during the ten years up to 1948.

#### Interesting Answers to the Questions:

"If you could have your building built over again: (1) What would you have in it that is now lacking? (2) What features of your present building would you wish to see eliminated? (3) What features do you consider so indispensable that you would insist on having them incorporated in any new building?"

Out of some outstanding reactions, eleven libraries reported that noise control was unsatisfactory, especially in corridors and delivery halls. Nine wished they had air-conditioning. Six complained of poor lighting. Eight found inadequate working space for the staff. Among the "wants" were more telephones, more storage space for supplies, more toilet facilities, more reading-room space.

Some may be surprised at what was "most liked." These features included "informality," windows from ceiling to floor, ample telephone and buzzer facilities, provision for expansion and two stairways in one building.

Space relationships brought direct comments. One librarian wished he had reading-room areas visible from the circulation desk. Four librarians wanted greater accessibility to stacks from the reading room. Two librarians complained that the public card cata-

log was located too far from the catalog and order departments.

Among the "wants" not included in the new buildings they occupied, the votes were as follows: projection and lecture rooms (seven libraries); music listening room (six); conference, seminar, study rooms (five); kitchenette near staff lounge (four); photo laboratory (three); and typing rooms (two). There were sixteen additional single votes for different facilities.

In the field of equipment, needs narrowed down to a few items. Four librarians reported a need for more exhibit and display fixtures, and two asked for standard-sized furniture and shelves. Built-in catalog cases were not generally looked upon with favor, though two librarians expressed a preference for built-in equipment for maps, folio books and displays.

The report stated that of the 33 librarians who replied, 22 were working in libraries in which they had not participated in the planning. Seven were generally unfavorable, eleven critical of some features, and fifteen were mostly favorable. Of the remaining eleven librarians, all of whom had participated in the planning, only two were partly critical and the remainder were favorable. None made extremely unfavorable comments.

Detailed studies of large university libraries in the last few years have tended to raise many questions of a similar nature and emphasize the need for a long-range view of library planning.<sup>9</sup>

#### Recent Developments

One or more of the many ideas advanced by leaders in library planning may be found in the newer library buildings on college campuses in all sections of the country. Modular planning is stressed in a few of them. In all cases where modular principles have been applied, emphasis is on their use to attain flexibility. The subject is discussed thoroughly in the Co-operative Committee's report as well as in other recent works.

The library buildings at the State University of Iowa and at Princeton University are designed along modular lines.

Here are a few of the colleges and universities mentioned in recent literature in connection with new building plans or construction: Princeton University; Massachusetts Institute of Technology; State University of Iowa; University of Oregon; University of Colorado; Drake University; Rockford College; Albion College; Skidmore College; Colorado State College at Greeley; University of Nebraska; and University of Pennsylvania.

#### Some Additional Variables

Modern library planners place great emphasis upon the variables. Men and women who have devoted

<sup>8</sup> *College and Research Libraries*, July, 1948, p. 221.

<sup>9</sup> *Reports, Studies of Library Buildings*. Columbia and Cornell Universities, reviewed College and Research Libraries, October, 1948, pp. 367-368.

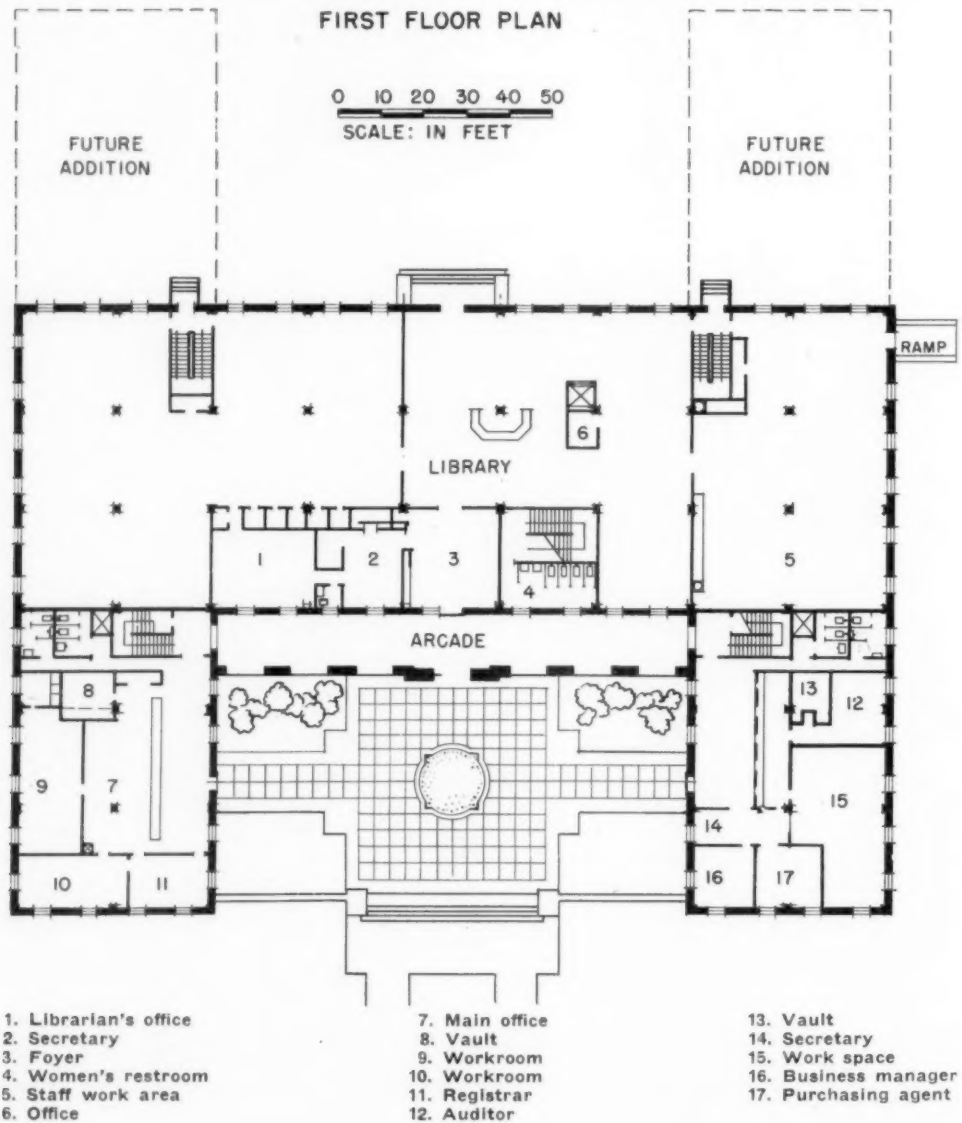


These facilities are shaped to institutional needs and occupy the same building as classrooms.





The H-shaped library of Texas College of Arts and Sciences, Kingsville, provides space for administrative offices at each end of the H and regular library facilities between them.



their lives to library work say that in each college, however closely it may seem to follow the curriculum of some other institution, there may still be important differences that will affect individual building plans.

To all these variables, we may add another sort. There is, for example, the simple question of finances. How much money is available? There is also the question of the status of development of the college. Is it a new institution, just beginning to build? How far can it go in its first steps? Is it a college suddenly confronted with rising enrollment, with limited finances, a need for immediate, though limited facilities? Does it require combination of library and other facilities for reasons peculiar to itself? In each case, the planning of library facilities must be adjusted to the real problems of the college.

Two years ago, LeMoyne College, Syracuse, New York, acquired a large tract for a campus without a building on it, adopted a master plan and proceeded to build within its immediate needs. The master plan provides for a library building, anticipating increased enrollment. Meanwhile, however, provision had to be made for a library.

In this case, the first building, an Administration Building, was designed to house several important facilities, among them the library. This was planned

to permit use of the space for future classrooms, when the library building is constructed.

Another illustration of the circumstances that shape library planning might be cited at Iona College, New Rochelle, New York. In his description of plans for the future of the institution, the president of Iona said, "We do not consider it necessary that Iona should develop into a very large institution, though its location is obviously such that present and future demands may well press for planned growth. We believe that there will always be a special place and special work for the small college. . . ."

Confronted with rapid increase in enrollment, the college authorized a library building, but because of the plan for controlled growth, determined to place the cafeteria on the lower floor. Ultimately, the cafeteria space will be taken over by the library. By taking advantage of the grade of the terrain, it was possible to provide separate entrances, one on each floor, and at the same time plan for future enlargement of the library building.

This "variable" did not hamper sound library planning. Staff work space of all kinds was grouped together with a control desk having full view of the reading room.

The combination of reading alcoves with the reading



room permitted placement of open shelves in adequate quantities and so arranged that books are accessible to all students. The plan permits maximum flexibility and will enable administrators of the library to adjust its facilities to all reasonable future contingencies.

#### **Agricultural and Technical College**

North Carolina Agricultural and Technical College presents a different situation. Here the college wanted a new library building devoted entirely to library facilities, with provision for future growth.

Three wings radiating from a central core constitute the essential basic plan of North Carolina's library building.

The north wing is designed essentially for book stacks and will accommodate 225,000 books, a number that permits expansion beyond present needs. The east wing will be devoted primarily to student activities and interests. The south wing has been set aside for specialized or secondary student activity. The central core projects on the west and is planned primarily for administrative facilities. Future growth will permit expansion of any or all of the wings depending upon college needs, without disturbing the essential program. Again elasticity of use was the goal.

A close-up view of the North Carolina building reveals how the core-wing principle fits into the college's library administrative scheme.

#### **Central Core—Administrative**

The ground floor of the central core provides space for a book repair room, tubes and book lift, microfilm vault, darkroom, mechanical equipment, elevator, and janitor's room. On the first floor are storage and receiving rooms, a covered loading platform, staff toilet and restroom, closets, lobby control desk, reference library desk, entrance lobby, men's and women's public toilets, telephones, passenger elevator, tubes and book lift.

On the second floor are more related facilities which include staff and library offices, work space, the circulation desk, men's and women's toilets, elevator, tubes and book lift. On this floor is also located a special collection room, separated from other similar activities because it is less likely to be used frequently.

Although the third floor is set back from the remainder of the building, there is room in the central core for the faculty reading room, kitchen, storage, restrooms, elevator, book lift and tubes.

#### **North Wing—Stacks**

The ground floor of the north wing is given over essentially to book stacks. Natural light and ventilation are provided on three sides. Immediately above, on the first floor, are to be found ten sound-proofed typing carrels, 25 study carrels. These are arranged along exterior walls, one window to each carrel, with the stacks occupying the center of the area. Book stacks and 35 more carrels occupy the second floor. On the third floor in addition to book stacks, space

is set aside for faculty study and special research rooms with skylights.

#### **East Wing—Student Activities**

The first floor of the east wing accommodates 288 persons in the reserve book reading room, with reserve book stacks readily accessible to students. Additional space is allocated for open bookcases about this reading room. Immediately above, on the second floor, the chief space is occupied by the main reading room, also providing for 288 students. More open shelves will be strategically placed in this room, with adequate areas for bibliographical and card catalogs. The third floor contains two audio-visual rooms and one large room with a raised platform at the east end. This space may be divided by use of folding partitions into seven seminar rooms, or may be used as one large auditorium, with platform. The object of design here, of course, was utmost of flexibility.

#### **South Wing—Specialized Student Activity**

The ground floor of this wing is set aside for 275 student lockers. On the first floor is the periodicals and documents room, with open shelves and accommodations for 44 persons. In response to the widespread feeling that smoking should be permitted in at least one room, a small reading room for 76 persons is located on the second floor. A graduate study room is on the third floor.

Viewed horizontally, the building achieves two vital administrative factors: adequate controls and flexibility. The principal point of control is in the entrance lobby on the first floor which constitutes the sole entrance and exit point of the building. Necessary provision has been made for emergency exits from the reading rooms by a fire stair, in clear view of the librarians, and there is an alarm bell on each door. The cellar floor and the third floor do not have provision for secondary control because they need none. The cellar floor will be used by the faculty and staff, the third floor by the faculty, staff, and graduate students, and for non-book activities in the seminar rooms.

The second-floor plan provides secondary control at the circulation desk, adjacent to the work space, book stacks and card catalogs, with a view of the main reading room, smoking-reading room, and special collection room.

Because of the universal need for flexible arrangement, all reading rooms are planned to permit use of open shelves which may be moved at any time to suit immediate needs. The core-wing plan makes it possible to expand the building in all four directions. Since each wing houses a department, one or all may be expanded without altering the basic administrative relationships essential to library management. The radiating plan also makes possible the use of maximum natural light in all departments. Use of folding partitions in the seminar rooms on the third floor is another illustration of elasticity.





**Texas College of Arts and Industries**

The control desk of the library is located opposite the main entrance on the first floor, where it can serve all traffic from the main staircase and main entrance doors. Administrative operations of the library are grouped. Adjacent to the main library reading room, which measures 160 feet by 65 feet, are the offices of

In this case, the authorities found it practicable to combine two administrative functions under one roof, without interference. Administrative wings are completely independent of the library, having their own entrances, stairs, and provision for traffic circulation.

The planning of the library, as indeed the whole building, represents the lifetime experience of Arthur T. Vanderbilt, dean emeritus of the School of Law and now chief justice of the Supreme Court of the State of New Jersey. A leading educator with a rich background of experience, Dean Vanderbilt was eager to have the law library designed to give fundamental

and indispensable experience to future attorneys attending the school. The manner in which the library was woven into the fabric of the school reveals the application of Dean Vanderbilt's philosophy, supported by his successor, Dean Russell D. Niles, that lawyers must know how to handle law books in legal research.

The location of 48 study carrels along one wall in the sub-basement, where the air-conditioned stack room is located, is just one of many expressions of the need for accessibility of books to students. Carrels are planned to permit assignment of each to a student for specified periods of time, so that books may be left there while study or research work goes on. A combination of fluorescent and incandescent lighting is provided on the basement and sub-basement floors.

On the basement level with stack rooms are 48 additional carrels and 34 typing carrels that are grouped in a large room with an acoustic tile ceiling.

The main reading room of the library, on the first floor, measuring 55 feet by 200 feet with equal space on the two lower floors, will accommodate 300,000 volumes. All library units of the building will permit simultaneous use of library facilities by 550 students and faculty members at one time. Open shelves in the main reading room will be adequate to handle 20,000 volumes. The librarian's control desk has a clear view of the whole area.

Book lifts and pneumatic tubes link all three floors and also library facilities on the third and fourth floors of the building. The faculty lounge and library, with a special stack room, is located on the third floor. Space is set aside for librarian staff work on that floor, too. Since considerable use of library facilities is made by student publications and other university periodicals, the library operation is closely linked with offices for this work on the fourth floor. A stack room, in addition to service by book lift and pneumatic tube, will serve that floor.

Since location of facilities differs from library to library, depending upon the functions they are intended to serve, the law library will not necessarily follow the pattern of other college libraries in many details. But certain familiar principles do apply.

Among these are the central location of the control desk, the grouping of space for staff work, and the combination of stack rooms, carrels and open shelf arrangements to permit maximum access to books.

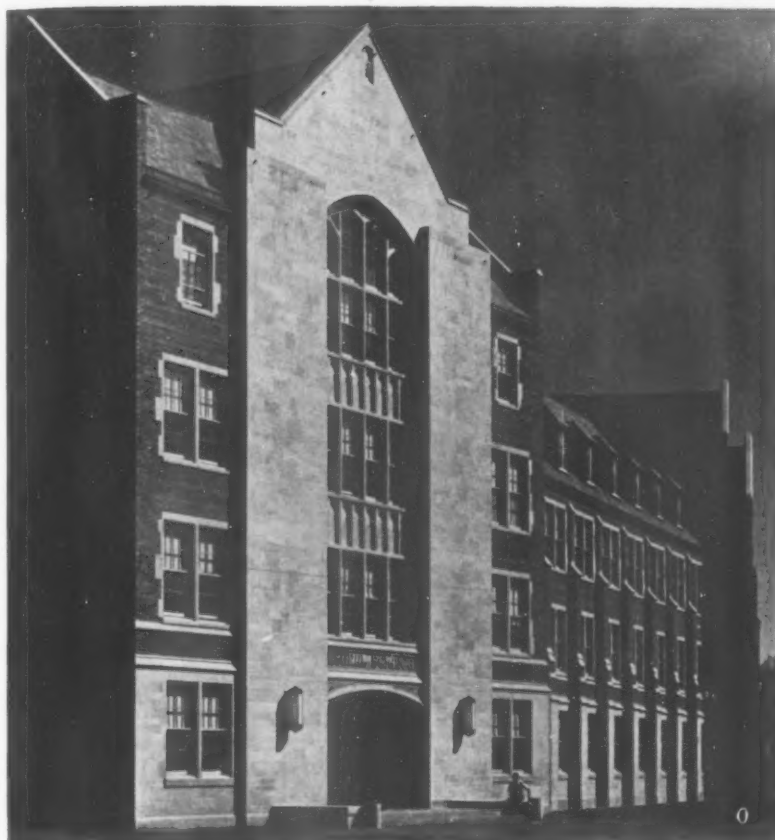
#### One Great New Library Project

One project of universal interest, not only to college and university librarians and officials but to all concerned with the library as an implement to the advancement of knowledge, is the Army Medical Library. Dr. William H. Welch once said, "The Army Medical Library and its index catalogue are America's greatest gift to medicine."

Rich in tradition, recognized for its monumental service to medical science and humanity, and reflecting the careers of many distinguished scientists for more than a century, the Army Medical Library has been in need of new quarters for many years. First steps toward a new building were taken in 1940. World War II intervened and more recently, the association of the library project with other building projects of the national government has brought delay in its realization. However, viewing the prospects of ultimate construction in the light of the persistence, courage and perspicacity of its leadership, the Army Medical Library assuredly will grow and in the foreseeable future be housed satisfactorily.

Two recent articles on the work of this great institution appeared in *College and Research Libraries*. One, by Wyllis E. Wright, librarian of Williams College, appeared in the January, 1948 issue, while the other, by Scott Adams, acting librarian of the Army Medical Library, was published in April, 1948.

The Army Medical Library has one of the largest inter-library loan services in the country. Its loans in 1947 encompassed 20,000 items. It serves various departments of government; civilian medical libraries, including libraries of schools of medicine, pharmacy, and dentistry; and the individual civilian physician. It is a division of the Office of the Surgeon General of the Army and is twice the size of the largest civilian medical library in the United States. In 1947, its loan service included the microfilming of 1,120,000 pages.



## NEW NATURAL SCIENCE BUILDING

By JOHN C. LEONARD

News Bureau, Public Relations Department,  
Michigan State College, East Lansing

**T**EACHING and research facilities at Michigan State College have been greatly increased with the completion of the new Natural Science Building on the East Lansing campus.

Reputedly the largest structure of its kind in the world, the new building covers an area of 38,000 square feet, nearly nine-tenths of an acre, and houses 157 laboratories, offices, lecture and recitation rooms.

At capacity the structure can adequately accommodate 3,000 students in its 255,600 square feet of floor space. In the building are the departments of zoology, botany, entomology, geology and geography, and two department's of Michigan State's Basic College: biological science and physical science.

In addition, 48 offices serve department heads, their staffs and chief administrator, Dean Lloyd C. Emmons, head of the School of Science and Arts. Departments are grouped in series through the length of the building, each occupying space vertically from the basement to the fourth floor.

### Michigan State's Expansion Program

Completion of the new structure marked another step in Michigan State College's vast \$31,200,000 building program which includes an Agricultural Engineering Building, Electrical Engineering Building, Physics and Mathematics Building, Berkey Hall

Mr. Leonard, since his graduation from Michigan State College in 1948 as a journalism major, has been a member of that college's Department of Public Relations. Prior to going to college, he spent three years in the U. S. Infantry and also worked for the "Isabella County Times-News" in Mt. Pleasant. He holds the title of assistant news-editor and is in charge of all college publications.



classroom building, a new power plant, food storage building, six dormitories, a large addition to the student union building and enlargement of the Macklin football stadium to 50,000 seating capacity. Approximately \$18,700,000 of this program was financed with self-liquidating funds, while \$12,500,000 was received through appropriation by the Michigan legislature.

The Department of Botany has a modern herbarium containing 100,000 plant specimens. One of the foremost collections of Michigan plant life, the herbarium is now in fireproof, insect-proof cases. Previously it was stored in a cellar corner of one of the college's more ancient buildings.

In the Department of Entomology is an aquatic insect laboratory used for both short-time and permanent studies of various aquatic insect habits. Utilized in classwork, the laboratory also serves for experi-



mentation in stream and pond improvement, and for study of insects which form a vital link in the food chain of many game fish.

"Our new setup," said entomology head Ray Hutson, "not only satisfies our ego, but is a real step forward in satisfying needs of the people we serve."

#### Excellent Cartography Equipment

Stanard G. Bergquist, head of the Department of Geology and Geography, feels much the same way.

Expansion of cartography equipment and facilities through completion of fine well lighted map rooms provides a course in the study and drawing of maps "equal to any school in the country." One of the first schools to offer a course in photogrammetry (aerogeology), Michigan State is still one of the leaders in the field. Dr. Bergquist's department includes a depository for the U.S. Army Map Service, which contains 60,000 maps at hand for study and research.

Illuminated laboratory desks, modern optical equip-



Geology students find new laboratory equipment in the natural science building at Michigan State makes possible closer scientific scrutiny of ancient rocks. Grinding and polishing stones are part of term projects in classes in geology.





Skylights illuminate the mapmaking room on the fourth floor of the building. Individual viewing and tracing rooms are provided at right. Cartography department is housed on fourth floor also.



Science faculty members at Michigan State College have their own research laboratory. Here, they prepare problems in biology for their classes and conduct research in their specialized fields.

ment and storage room for anatomical specimens are available for instruction of zoology students studying animal histology, embryology, and anatomy.

Considered among the best in the nation for training experts in the fields of wildlife management and fisheries biology, the Department of Zoology now has the latest in equipment and facilities. Movable aquariums, an aquarium display, constant temperature rooms, and a large research laboratory are housed in roomy quarters allowing students ideal study conditions and easy access to equipment for research.

The biological and basic sciences for the first time in the college's history are all housed under one roof as opposed to previous scattering in buildings all over the campus.

#### **Building Designed for More Effective Teaching**

"The advantages of this close-knit coordination are evident," said Dean Emmons. "The building has brought six of the principal science departments of this college into close working relationship. New laboratories equipped with the best available instruments will enable these departments to do more effective teaching either individually or cooperatively at the undergraduate and graduate levels."

Dean Emmons also stressed that more extensive and constructive research can now be carried out which, in turn, will give citizens of the state and nation better and more complete information on scientific developments.

Completion of the new building has also relieved other departments, temporarily at least, of shortage of

classroom space. Now such departments as English, public administration, social service, foreign studies, history, and political science have taken over quarters vacated by departments that moved to the new Natural Science Building.

Of equal importance is the fact that other departments once housed in barracks and steel classrooms now have permanent quarters in rooms formerly occupied by basic and biological science departments.

Plans for the new building were completed in 1939 by a committee of five Michigan State College professors. With the exception of a few changes, including an extra wing, these plans remained the same. The latter change was made to accommodate the departments of physical science and biological science. These departments were formed in 1944 under the Basic College, designed to give freshman and sophomore students a well rounded education before entering their specific fields of study.

#### **Easy Access to Classes**

Construction began in 1946, and three years later the building was ready for occupation. Centrally located, the structure solves a problem of time for students who until this fall rushed to the four corners of the campus to attend classes. Students now have easy access to other classroom buildings and important campus activities.

Completion of the Natural Science Building has greatly altered the campus picture at Michigan State College—and certainly alleviated a chronic space shortage felt by many of its schools and departments.





## TEXAS CHRISTIAN UNIVERSITY'S FINE ARTS BUILDING AND AUDITORIUM

By PAUL O. RIDINGS and GORDON C. LUND

Texas Christian University News Service, Fort Worth



Mr. Lund has been editor of the Texas Christian University News Service since 1948. Before that he was editorial director of a Chicago public relations agency, Ridings and Ferris, Inc. After his graduation from Midland College in Nebraska where he was acting director of publicity during his senior year, he was assistant director of the Illinois Institute of Technology News Bureau in Chicago until he entered the U.S. Air Force.

Paul Ridings has been in the public relations field since receiving his M.A. from the University of Missouri in 1939. He has been Public Relations Director at Midland College, Fremont, Nebraska, Illinois Institute of Technology and Armour Research Foundation, Chicago, McCann-Erickson, Inc., Minneapolis, and TCU. He left his own public relations firm to head TCU's Journalism department, but recently has returned to it.



**T**HE NEW Texas Christian University Fine Arts Building and Auditorium was completed in Fort Worth last summer and occupied at the beginning of the fall semester. Housing all divisions of the Univer-

sity's School of Fine Arts, the building cost \$1.5 million; equipment \$200,000. It is the largest and costliest single unit in the university's \$10-million "total building program" to be completed by 1953.

The structure is 58 feet high (plus basement), 145 feet across the front, and 239 feet in length. It has 82 separate rooms including an auditorium, theater, library, art gallery, 23 offices, six classrooms, fourteen music studios, three art studios, and miscellaneous workshops and laboratories. This does not include the corridors, lounges, heating and air-conditioning plant, storage rooms, etc. Its 66,450 square feet of usable floor space provides facilities for training in almost every phase of the arts. Several new programs have already been evolved and are being offered for the first time at TCU this year.

Actually three buildings in one, the auditorium occupies the center portion. Offices, studios and classrooms of the School of Fine Arts, three stories high on three sides, surround the auditorium. The little theater is on the west end of the building with a separate entrance on the north.

A one-inch layer of "dead air" separates each of these three "buildings," augmenting soundproof wall construction. The entire building, from the auditorium to practice rooms, is air-conditioned.

#### Multi-Purpose Auditorium

Seating 1258 persons, the university auditorium, officially the Ed Landreth Auditorium in honor of the chairman of the TCU Building Committee, is designed for general university functions as well as fine arts

productions. The stage is acoustically designed for radio broadcasting and transcription. One suspended microphone will pick up an entire chorus, symphony or operatic production. The concert pipe organ, a 70-rank four-manual instrument, is one of the largest pipe organs in the South. When not in use its "portable" console rolls off the stage onto the wings.

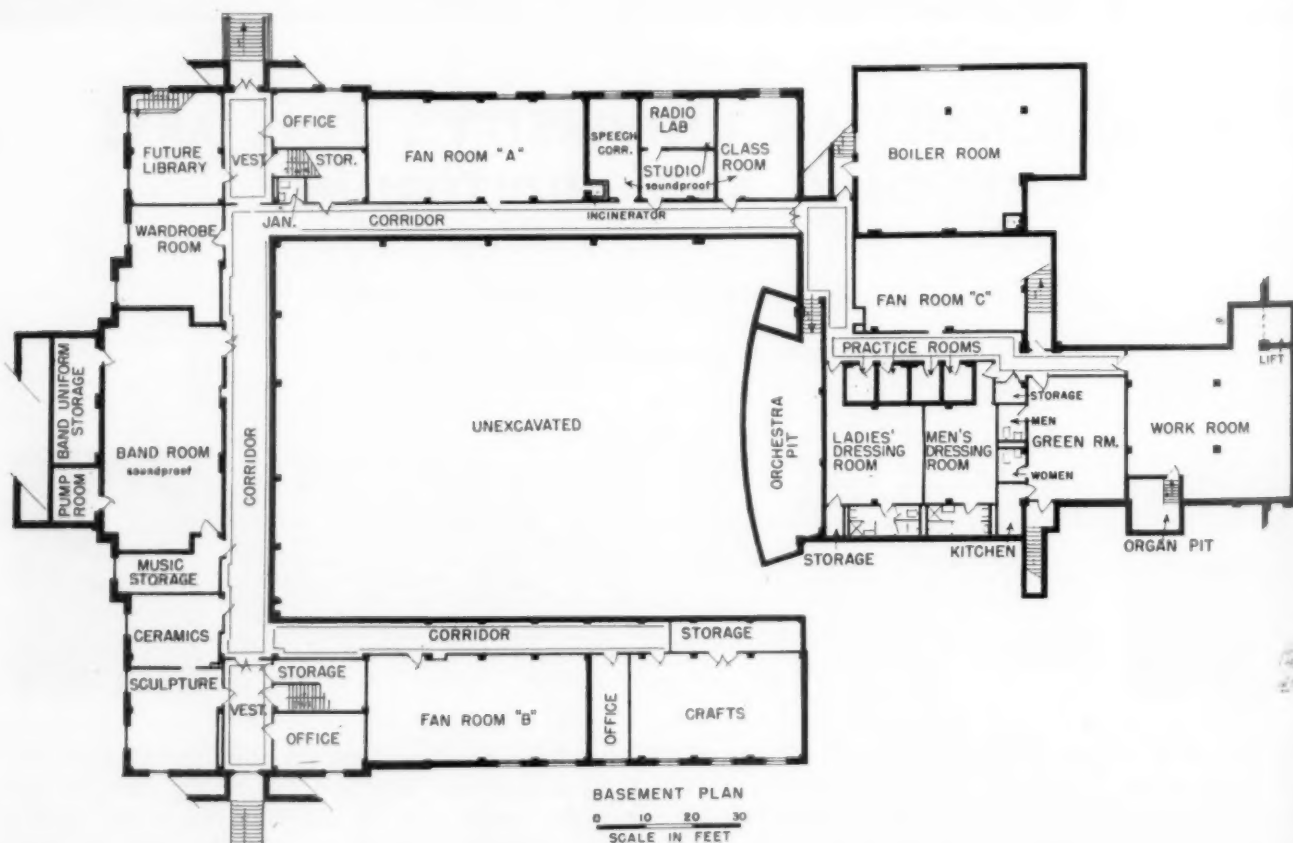
Programs from other parts of the building—radio studios or the little theater, for example—can be heard in the auditorium by means of a loudspeaker connected to the intercommunication system, which covers the entire plant.

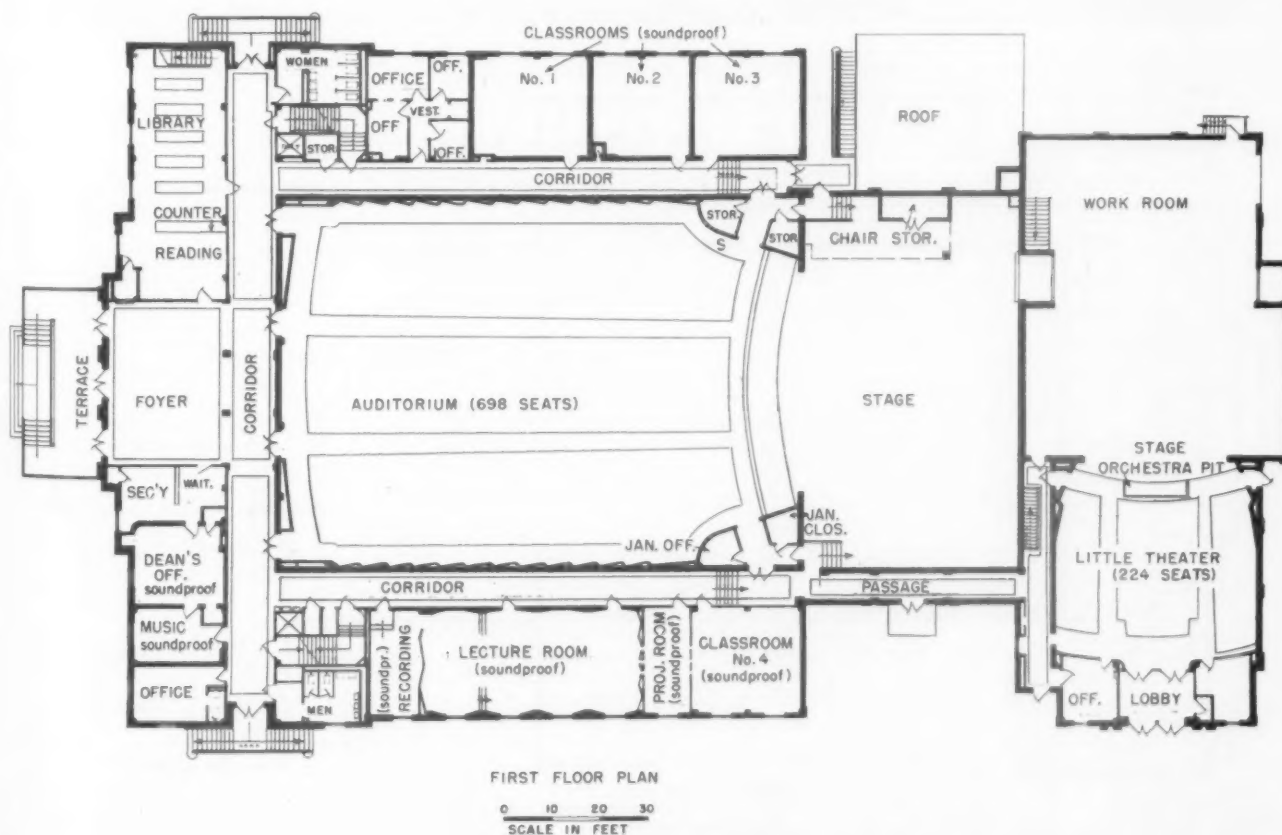
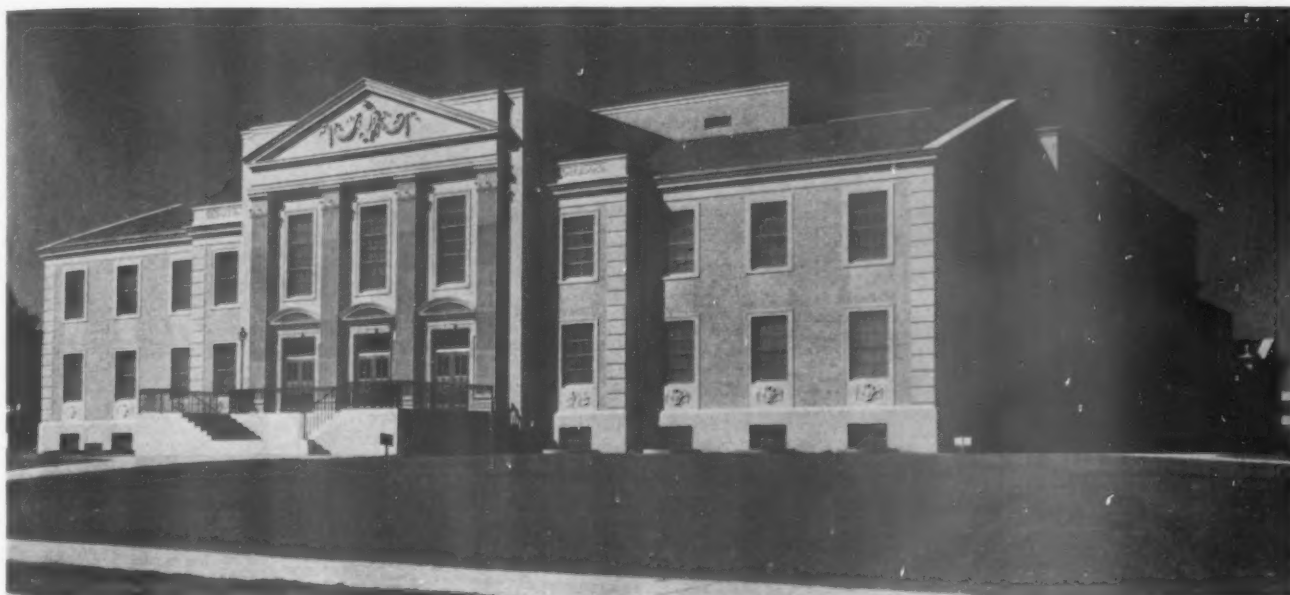
For programs by the university's symphony orchestra, a hanging "shell" is suspended from overhead tracks in sections, permitting the shell to be set in place or removed in a matter of minutes. The stage is 44 feet wide and 45 feet deep, with a proscenium 30 feet high.

#### Texas's Finest

The little theater, built according to the "intimate" trend of modern theater design, seats 224 persons, none more than 75 feet from the center of the stage. It is the best equipped legitimate theater stage in Texas, with more than \$20,000 worth of lighting equipment and \$37,000 worth of rigging.

Scenery changes are a matter of seconds, for entire sets are built on special "wagons" and moved on or

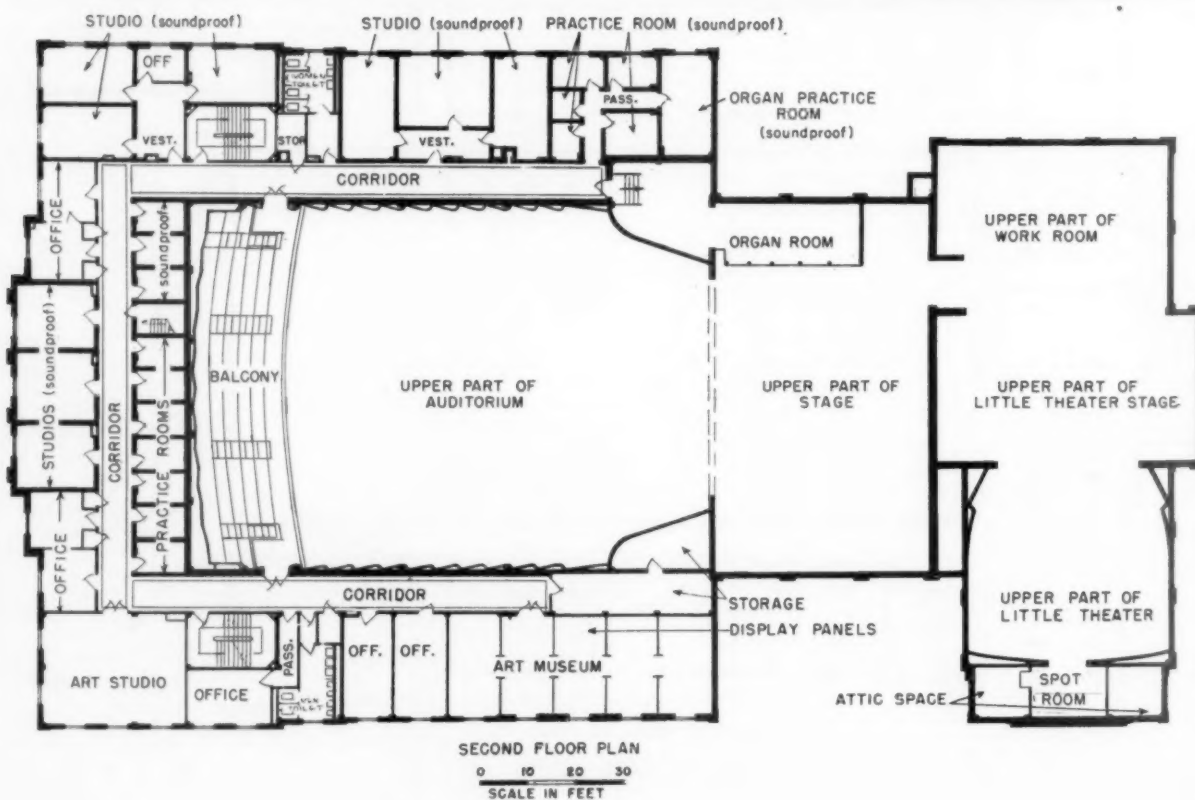


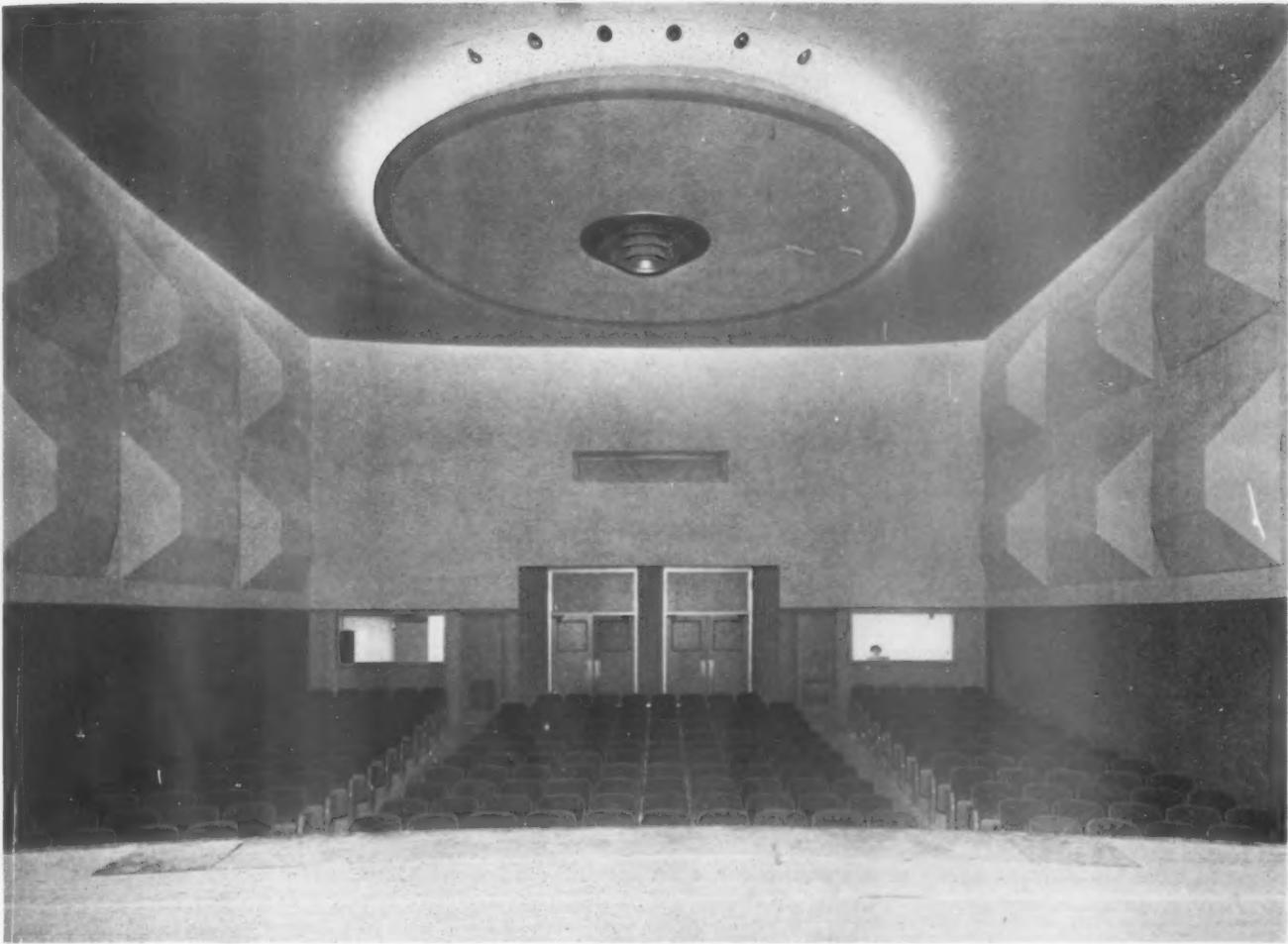


FIRST FLOOR PLAN

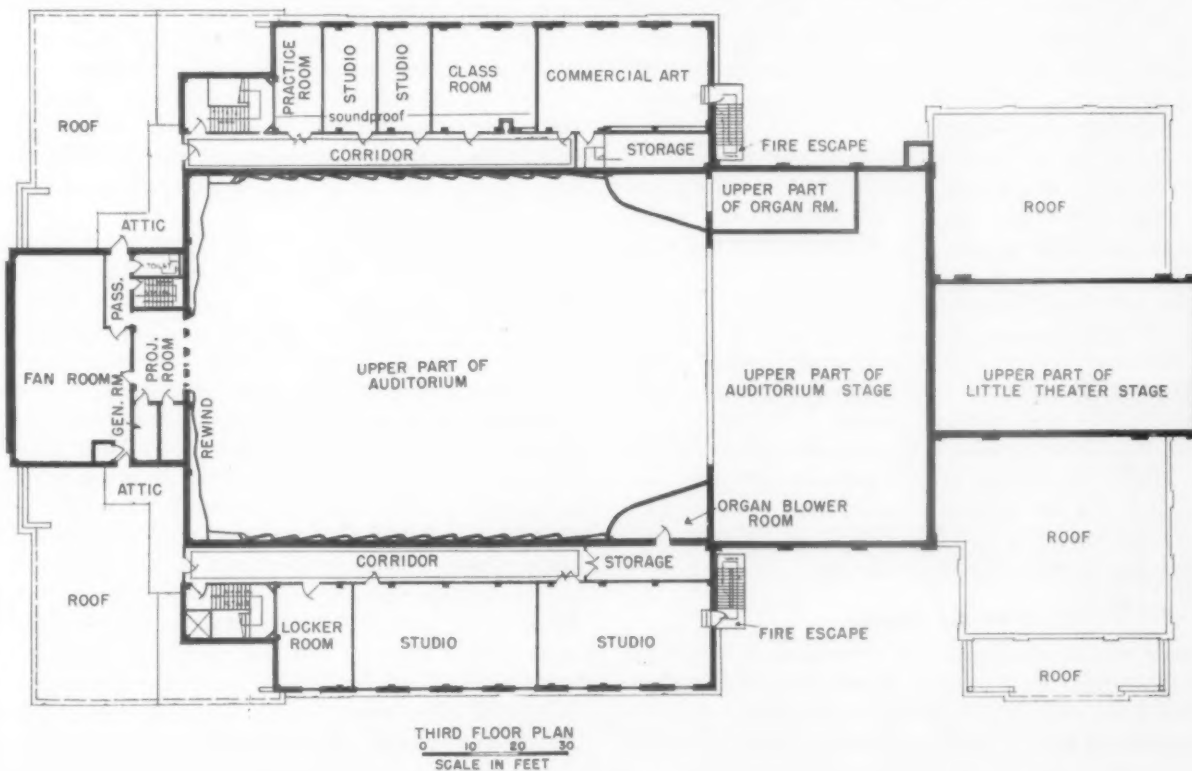
0 10 20 30  
SCALE IN FEET







Note the acoustical paneling, unique overhead lighting fixture, and lighting control panel (left, rear) in TCU's little theater.





The corridors are similar to this portion of the art gallery, with indirect lighting and concealed molding.

off stage in one motion. Overture and intermission music is provided by an electronic organ, with console in a glass-enclosed room at the rear of the theater. Behind a second glass panel at the rear is the lighting control room, from which theater students study stage lighting during productions.

The left wing of the theater stage and the rear of the auditorium stage are separated by soundproof doors that permit the use of all lighting and stage equipment on both stages. Both stages may be used simultaneously without sound interference.

Direct telephone lines connect all production departments of both theater and auditorium. A play or opera director can sit in the fourth row of either room and talk with lighting technicians, stage director, dressing rooms, and costume rooms.

Scenery and costumes for plays and operas will be made in the workshop and wardrobe room in the basement below the stages. These rooms are equipped with power tools for building furniture and sets and for sewing and even weaving fabrics.

#### A Model Studio

A scale model of a national network headquarters, the radio studio and control room have a complete setup of RCA equipment of the latest design.

Direct loops lead to each of five Fort Worth broad-

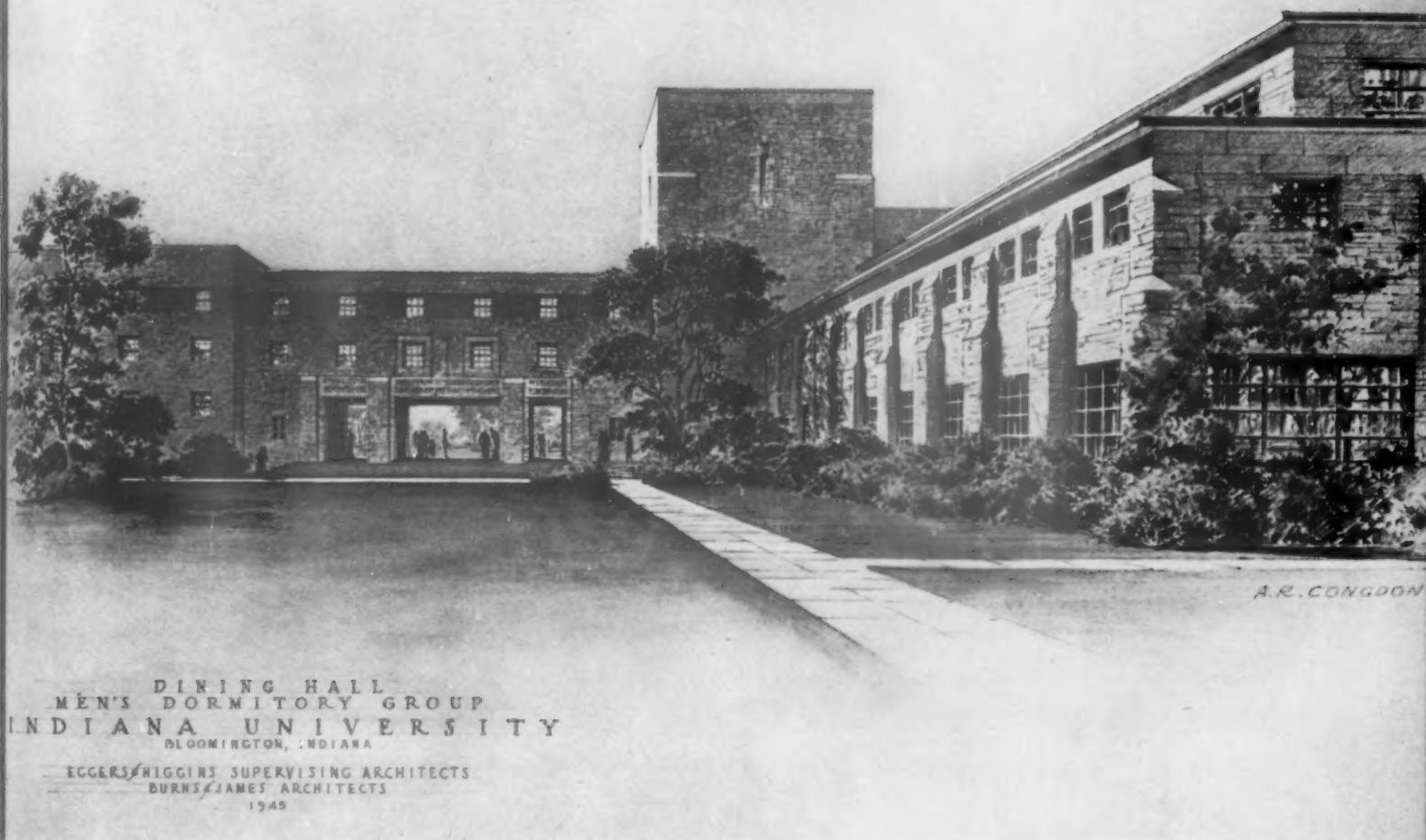
cast stations, and control room facilities can handle two broadcasts simultaneously. Programs can be picked up from the studio itself, the auditorium or theater, or any other point in the building. An announcer in the studio, a symphony or chorus in the auditorium, a lecturer in the little theater, and a soloist in a music studio could all participate in a single broadcast, with programming directed from the control room.

The stage of the auditorium, and its orchestra pit will accommodate a full 75-piece symphony orchestra. It is the only stage in the Southwest adequate for opera staging, and the School of Fine Arts this fall opened an Opera Workshop, with instruction in chorus and aria singing, staging, and direction.

Other programs include a major curriculum in church music, sculpture, and ballet. New individual courses in television, radio control room operation, transcribing, interior design and decoration, stage lighting, and technical problems of stagecraft have been added to the curriculum.

The building was designed by Architect Wyatt C. Hedrick and Associate Architects Joseph R. Pelich and Preston Geren. General design and arrangement were worked out by T. Smith McCorkle, dean of the School of Fine Arts. Erection was by the Thomas S. Byrne Construction Company.





## DORMITORIES

By THEODORE J. YOUNG

Eggers and Higgins, Architects, New York City

**D**ORMITORIES are in the spotlight these days and seemed destined to be of major interest to college and university buildings for some time. There are many reasons for the recent stimulation in dormitory building, but perhaps the most immediate was the general shortage of proper housing accommodations in many institutions immediately after the war, when young veterans returned in unprecedented numbers to resume their studies.

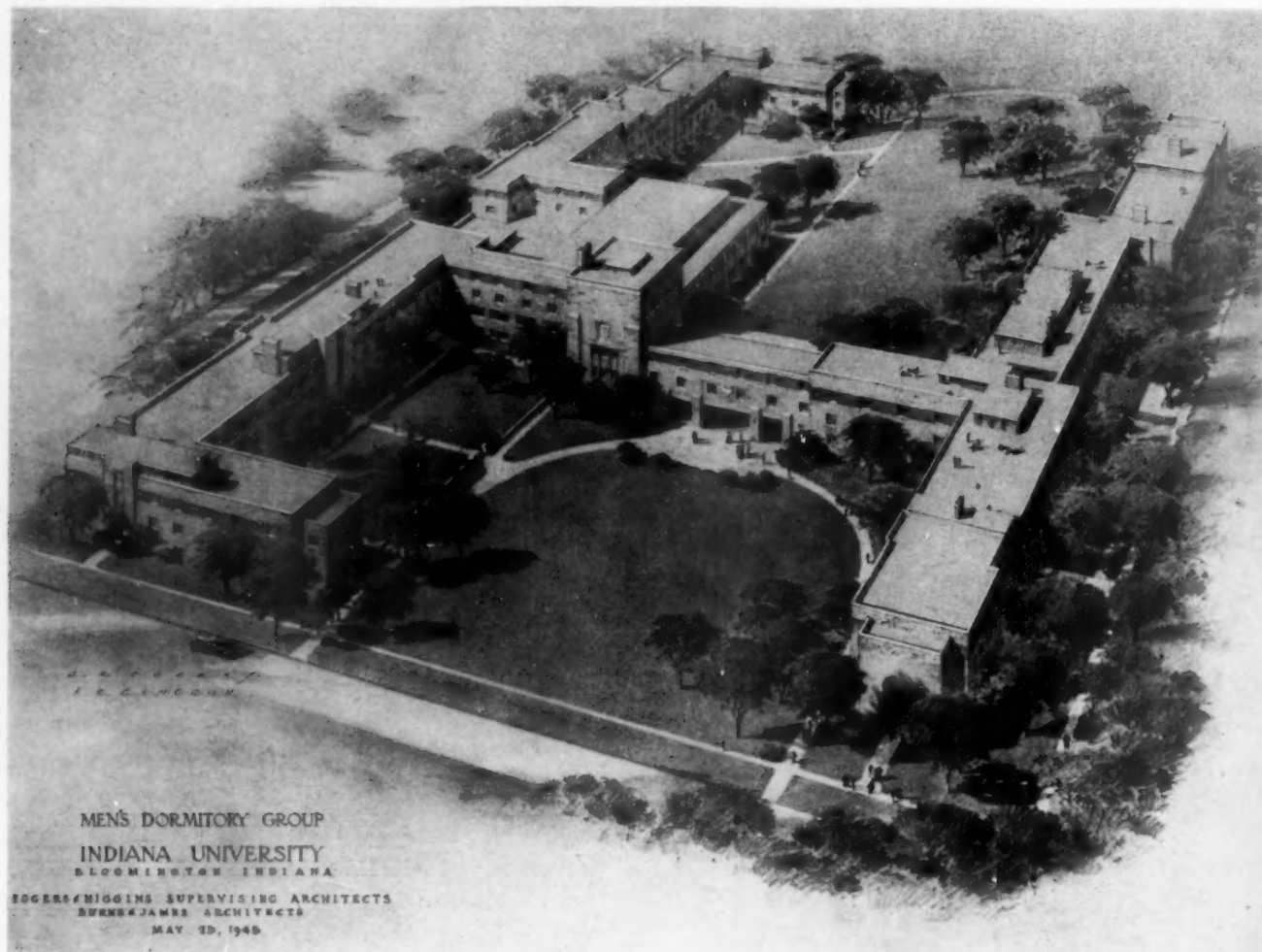
It is also true that before the war, there was a tendency to devote somewhat more attention to other college buildings. Now that the increased birth rate has raised primary and secondary school enrollments,

Theodore J. Young was graduated from the University of Toronto with the degree of B.Arch. He is a registered architect in New York and a partner in the firm of Eggers & Higgins. He is a member of the American Institute of Architects and has been designing and planning university and public buildings for 25 years.



dormitories will receive much more needed attention, for the dormitory is the student's college home.

There are many points of similarity between a home



for a family and a dormitory for a college or university. The dormitory is to the college what the home is to the family. The home builder wants an economical structure providing a maximum of living space. So does the college or university when it seeks a dormitory. As families vary in size, in personal taste and habits, in economic status and desires, so also do colleges. Thus dormitories vary as homes may vary, except that in the case of colleges variations are wider because of the complexity of problems confronting an educational institution.

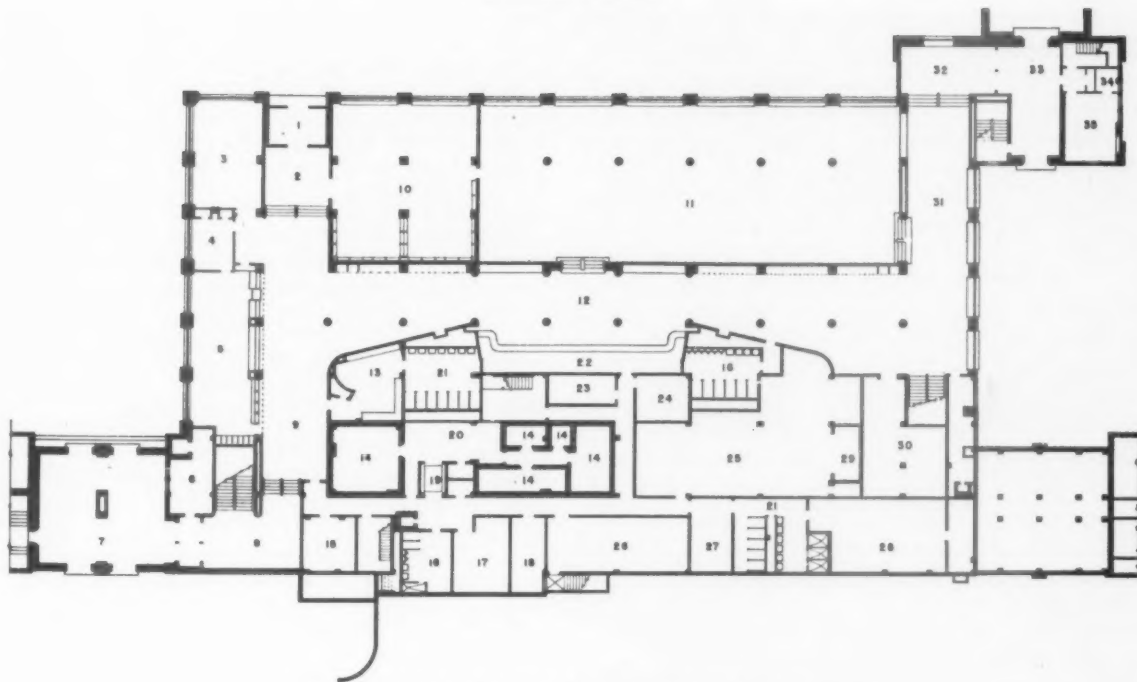
Planning a modern dormitory is a painstaking task because of the potential variations. What are the objectives of the specific college? How much can it afford? What other facilities are or are not on the campus? A myriad of questions immediately confront the planner.

The fact that dormitory planning has not had the advantage of minute scrutiny such as has been given other institutional buildings in recent years may be construed as an asset. It imposes greater challenges

upon planners, but in certain respects it is assuredly a liability.

We have all witnessed the creation of exacting criteria for science buildings. The concentration on planning such college buildings was not an accident. It springs from the rapid changes that have taken place in the scientific world, the interchange of scientific activity and data, the new scientific concepts. Scientists who must work in these buildings found it necessary to participate in the development of new planning ideas to meet new scientific needs. To an extent this is also true of classrooms (or other instructional areas) and college libraries. Changing curriculums, altered teaching methods, and a general flux in educational techniques have spurred the faculties and librarians to action.

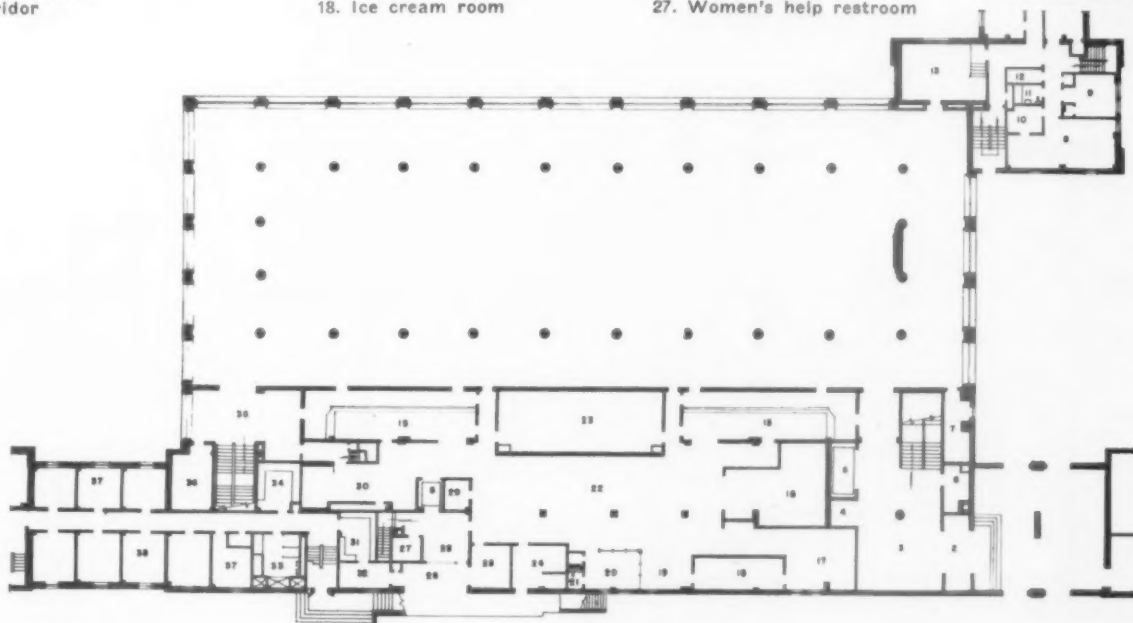
While all credit is due those officials who have sought to keep abreast of developments in dormitories, not so many members of the faculties are concerned every hour of the day with dormitories as with other campus buildings. Perhaps such conditions as these



Indiana University Men's Student Union Group

## Ground Floor

- |                                |                         |                           |                        |
|--------------------------------|-------------------------|---------------------------|------------------------|
| 1. Entrance vestibule          | 10. Library             | 19. Elevator shaft        | 28. Locker room        |
| 2. Corridor                    | 11. Lounge              | 20. Butcher               | 29. Elevator shaft     |
| 3. Periodical and waiting room | 12. Snack bar           | 21. Women's toilet        | 30. Coat room          |
| 4. Office                      | 13. Women's powder room | 22. Soda fountain         | 31. Corridor           |
| 5. General office              | 14. Refrigerator        | 23. Storage               | 32. Corridor           |
| 6. Mail room                   | 15. Service             | 24. Storage               | 33. Corridor           |
| 7. Passageway                  | 16. Men's toilet        | 25. Table storage         | 34. Headmaster storage |
| 8. Stair corridor              | 17. Compressor room     | 26. Can storage           | 35. Headmaster study   |
| 9. Corridor                    | 18. Ice cream room      | 27. Women's help restroom |                        |



## First Floor

- |                           |                           |                        |                          |
|---------------------------|---------------------------|------------------------|--------------------------|
| 1. Passageway             | 11. Headmaster bathroom   | 20. Dietitian office   | 29. Kitchen refrigerator |
| 2. Entrance vestibule     | 12. Storage               | 21. Dietitian bathroom | 30. Meat refrigerator    |
| 3. Corridor               | 13. Private dining hall   | 22. Kitchen            | 31. Linen room           |
| 4. Telephone room         | 14. Dining hall           | 23. Dishwashing        | 32. Soiled linen room    |
| 5. Elevator shaft         | 15. Service area          | 24. Can washing        | 33. Students' toilets    |
| 6. Soiled linen room      | 16. Pastry shop           | 25. Milk refrigerator  | 34. Linen room           |
| 7. Service                | 17. Vegetable preparation | 26. Receiving dock     | 35. Corridor             |
| 8. Headmaster living room | 18. Meat refrigerator     | 27. Checker room       | 36. Coat room            |
| 9. Headmaster bedroom     | 19. Butcher               | 28. Receiving room     | 37. Single bedroom       |
| 10. Headmaster kitchen    |                           |                        | 38. Double bedroom       |



plus the size of the task have retarded much needed research in dormitory planning.

We have had a certain amount of cumulative experience in dormitory planning which may add to the general fund of knowledge in this field. Among the latest dormitory projects are the men's dormitory at the University of Virginia and the men's and women's dormitories at the University of Indiana.

#### A Pioneer on Dormitories

The University of Virginia has an interesting historical tradition in the field of dormitories. On May 9, 1817, Thomas Jefferson took his pen in hand and set down what may well be deemed some pioneering thoughts on college and university dormitories. The University of Virginia has grown and changed since then, but it is still influenced by the general tenets of Jefferson and the other founders. For its unusual historical interest as well as its current applicability, the text of Jefferson's letter to William Thornton, architect, is pertinent:

"We are commencing here the establishment of a college and instead of building a magnificent house, which would exhaust all our funds, we propose to lay off a square about 700 or 800 feet on the outside of which we shall arrange separate pavilions, one for each professor and his scholars. Each pavilion will have a schoolroom below and two rooms for the Professor above, and between pavilion and pavilion

a range of dormitories for the boys, one story high, giving to each a room 10 feet wide and 14 feet deep. The pavilions about 36 feet wide in front and 24 feet in depth. This sketch gives you an idea of it.

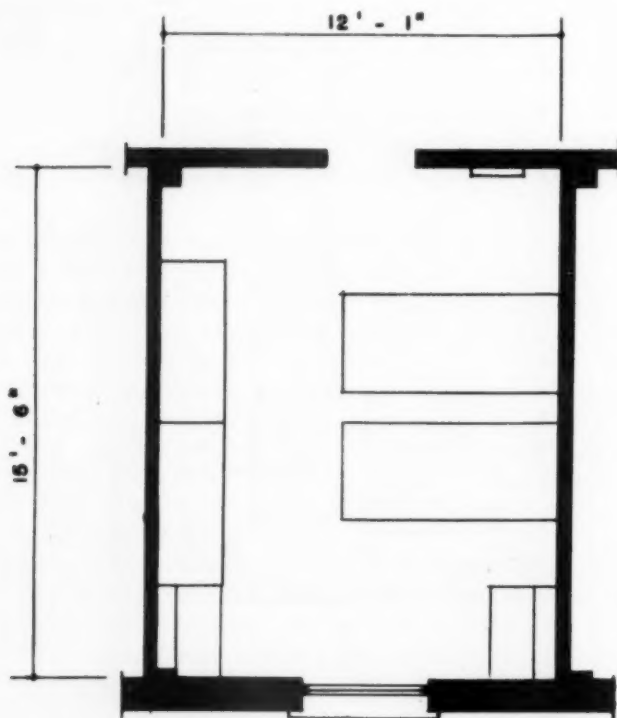
"The whole of the pavilions and dormitories to be united by a colonnade in front of the height of the lower story of the pavilions, under which they may go dry from school to school. The colonnade will be of square brick pilasters (at first) with a Tuscan entablature. Now what we wish is that these pavilions, as they will show themselves above the dormitories, shall be models of taste and good architecture and of a variety of appearance, no two alike, so as to serve as specimens for the Architectural lecturer. Will you set your imagination to work and sketch some designs for us?"

"The visitors of the college are President Monroe, Mr. Madison, three others whom you do not know, and myself. We have to struggle against two important wants—money and men for professors, capable of fulfilling our views. They may come in time, for all Europe seems to be breaking up. In the meantime, help us provide snug and handsome lodges for them. I salute you with friendship and respect. Th. Jefferson."<sup>1</sup>

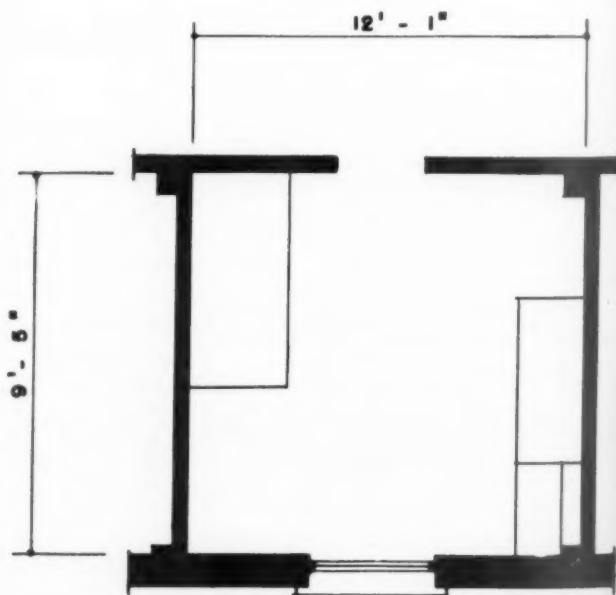
#### The Architect's Answer

After a modest introduction, in which he expressed fear that he would "fall very far short of what you require," Thornton replied that he would nevertheless "fully communicate my ideas." He needed more information and diplomatically suggested that plan-

<sup>1</sup> *Journal, American Institute of Architects*, p. 21, 1913.



TYPICAL DOUBLE ROOM



TYPICAL SINGLE ROOM

Men's Dormitory, Indiana University.

ning would involve some knowledge of the "extent of learning" at the proposed college. For, he said, room might be required for "apparatus" for scientific study. He suggested also the desirability of "diverting a rivulet" to make a swimming pool and the need for extra grounds for "exercises" such as running, riding, archery, shooting. And among other things, Thornton wondered about an area for "a Botanic Garden as well as a culinary one."

The most recent dormitory project at the University of Virginia is a group of ten men's dormitories, housing 1,430 students, scheduled for completion at the end of 1950. When completed, the buildings will be a natural expression of the needs and desires of the university and the ability of the architects, as all buildings must be.

The group of buildings has been planned for minimum coverage of ground with maximum sense of freedom. This has been achieved by the creation of



Student double room in new halls of residence, Indiana University. Picture at right shows study table; bottom, compartment storage wall and another study table.





Southeast corner of the library in the men's halls of residence, Indiana University. Below, post office and general office.







Main lounge in the men's halls of residence, Indiana University.

light, airy quadrangles which reflect a cheery atmosphere in the rooms. Buildings are arranged in L-shaped couplets, connected by enclosed links that contain an entrance and stair. Each two pairs form a separate quadrangle. The central campus runs between the two groups of four. Two corners of each quadrangle are left open for circulation of air. Additional units may be added as required. Athletic fields for the students are immediately accessible from the dormitories.

Formerly a golf course, the rolling character of the terrain offered somewhat different problems in the planning of each unit. Where the slope afforded natural sunlight to ground-floor rooms, the space was devoted to student use.

#### A Typical Dormitory Unit

The number of student rooms on the open side of the ground floor of each unit varies, according to the natural land contours. A group of showers and toilets is centrally located on each floor. A lounge is placed on the open side of the ground floor.

On the closed side of the building, space is devoted to a maintenance workshop, a darkroom, storage space for trunks, lost and found articles, mechanical equipment, etc.

A typical first floor contains twenty student rooms with a suite for the housemaster which includes a

living room, bedroom and kitchenette. A typical second and third floor has 22 student rooms. In each case there is a reception room on these floors.

Exteriors of the buildings were carefully studied so that they would harmonize with existing buildings. A slate roof and clean white painted wood cornices and trim contrast with old colonial red brick. Well proportioned entrances complete the graceful architectural picture.

If we turn now to the dormitory projects at the University of Indiana, we can see the variables that enter into dormitory planning. At the University of Virginia, the authorities requested an architectural style consonant with the tradition of the campus. At the University of Indiana, they preferred a style more contemporary in feeling but blending with their present buildings.

The University of Indiana determined to install dining facilities as part of the project. At Virginia, dining facilities will be provided elsewhere. Other variations are disclosed by a canvass of the facilities in the buildings. There was one point of similarity that is of more than passing interest: a sloping, rolling terrain that gave opportunity for stepping three-story buildings up and down to follow the land contour.

The men's dormitories at Indiana are designed to provide for 1,021 students. Essentially one building, the dormitory is roughly H-shaped and composed of



At right is the lounge in the East Tenth Street men's residence center, Indiana University. Two of the five recreation rooms in the dining hall wing are shown below and on the preceding page.



five units, all linked together. There are four dormitory units and one dining hall and kitchen unit.

Constructed at a cost of \$3,250,000 the dormitory center was financed through a sale of bonds which will mature in twenty years and be paid for by income from the rental of rooms. The whole center covers a ground area 700 feet by 322 feet. There are altogether 552 student single and double rooms. The main lounge in the dining hall wing measures 120 feet by 40 feet. The adjoining library is 40 feet by 48 feet with a small periodical room next door. There are five recreation rooms on the ground floor.

#### Dining Hall into Ballroom

The dining hall is the largest single room on the campus, exclusive of the university auditorium. It can quickly be converted into the largest ballroom on

the campus by removing the demountable dining hall furniture to a storage room on the lower floor. An attractive powder room for women visitors makes the dining hall suitable for social uses. The dining hall wing also houses a snack bar, a post office with individual boxes for all residents, central administrative offices, the headmaster's office, public telephone booths, and a checkroom.

The living area, though essentially one building, is really divided into eighteen houses, each accommodating 55 students and each supervised by a resident counselor. There are eighteen roof solarium lounges, one for each house.

Five recreation rooms in the dining hall wing, tennis courts adjacent to the parking lot outdoors, and squash courts inside the central tower are among the recreational facilities already provided. Plans are



being advanced for additional outdoor recreation spaces.

#### Women's Housing Units

Designed for 993 women, the Indiana University women's dormitory will follow an X-shape plan. The arrangement not only provides light and air to all rooms, but permits concentration of kitchen facilities into one large efficient unit serving individual dining halls in the four dormitory units. The central unit is three floors while dormitory units rise six stories high. Altogether, the women's dormitory will contain 153 single rooms, 420 double rooms, and six guest rooms. The central unit is about 74 feet by 100 feet and the other units approximately 40 feet by 260 feet.

The six floors of dormitory units above the basement are essentially the same for all four units. The sixth floor of each unit has fewer bedrooms than other floors because almost half of each wing is devoted to lounge-recreation deck facilities.

The center unit, or core of the building, is devoted primarily to kitchen and related facilities. In the basement, for example, are a vegetable preparation room; a vegetable refrigeration room; meat refrigeration and freezer, butcher, poultry, and dry storage space; and an elevator to the kitchen on the first floor. There are two dishwashing rooms, one at the juncture of each pair of wings, each having two dumbwaiters, one for each of the dining halls above. Two blanket storage rooms are also located in the basement of the center unit.

The major portion of the center unit's first floor is devoted to a kitchen, dietitian's office, pastry kitchen, and related facilities. The main lobby is flanked by offices, a stock room, and the building manager's suite which consists of a living room, bedroom, kitchen, and bath.

Basement areas of the four dormitory wings contain a wide variety of facilities which includes wash-rooms and toilets for employes as well as soiled linen rooms which receive laundry from chutes in each unit. There is space for recreation rooms, coke rooms, stor-

age, laundry, men's coat rooms, and toilets in three of the four wings.

The fourth wing has a somewhat different basement arrangement, setting aside space for a graduate lounge, graduate recreation room with an adjacent kitchen, and a coke room, all separate from the remainder of the basement. Other facilities include additional recreation and coke rooms, laundry, trunk storage, men's coat and toilet rooms, and maintenance supplies space with an office.

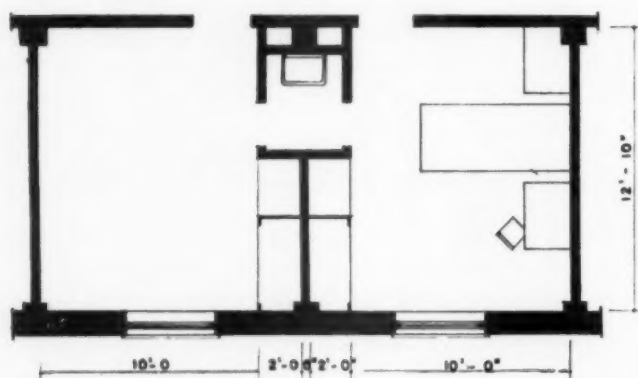
Dining halls, about 44 feet by 100 feet and accommodating 250 students, are located on the first floors of all four wings. Lounges are situated on the other side of the central corridor. In the center of each wing is an entrance lobby around which are clustered the head resident's suite, an office, an assistant counselor's room, a coat room, and dietitian's suite. On the first floor, the remaining area is taken up by four double rooms, one single room and group toilets and showers. One of the wings devotes bedroom space to four guest rooms and ten single rooms, a somewhat different room arrangement.

There are twenty double rooms on the second floor of three units, while a fourth has seven double rooms and fourteen singles. The center unit extends to this floor also. A library occupies part of the second floor space of the center unit. The remainder of the center unit space is taken up by a two-story kitchen which rises from the floor below and thus obtains excellent natural light.

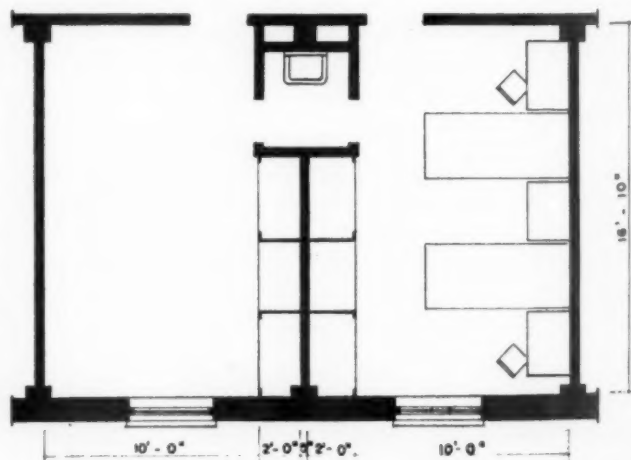
Although the number of single and double rooms varies on some floors, the third, fourth, and fifth floors are devoted principally to bedrooms and facilities such as small kitchens, linen rooms, shampoo and pressing rooms, and the like. The third or top floor of the center unit provides living suites for administrative personnel as well as six double rooms.

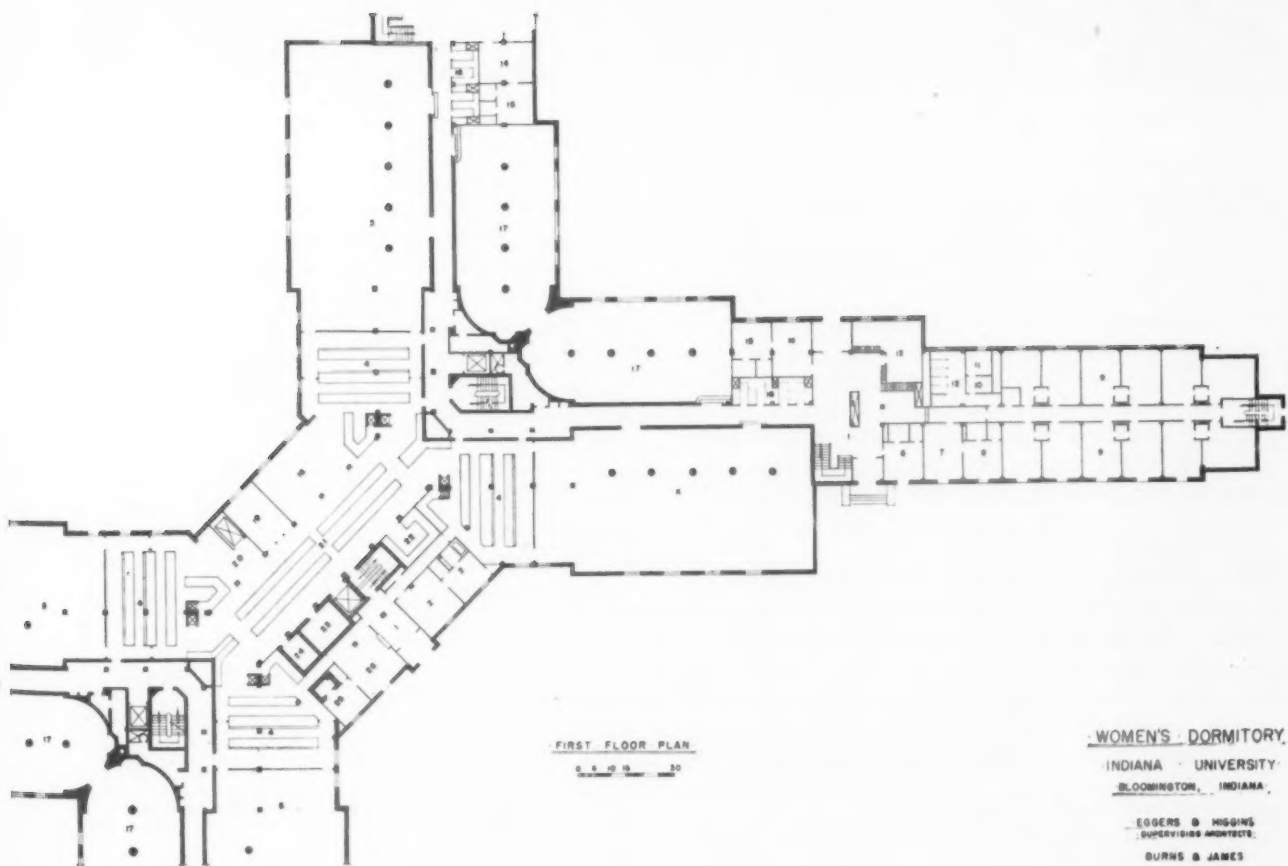
#### Planning Smaller Dormitories

How plans for smaller dormitories are similarly adjusted to the needs of the individual institution is revealed by a glimpse at the women's dormitories at



Women's dormitory at Indiana University. Floor plans of single and double rooms.





1. Lobby
2. Building manager
3. Bedroom
4. Service counter
5. Dining hall
6. Assistant counselor
7. Dietitian living room
8. Dietitian bedroom
9. Double rooms

10. Drying
11. Shower
12. Toilet
13. General office
14. Resident living room
15. Head bedroom
16. Coats
17. Lounge
18. Help's dining room

19. Dietitian
20. Bakery receiving
21. Kitchen
22. Pot scullery
23. Misc. refrigerator
24. Cook's refrigerator
25. Private office
26. Office

WOMEN'S DORMITORY,  
INDIANA UNIVERSITY,  
BLOOMINGTON, INDIANA.  
EGGERS & HIGGINS  
SUPERVISING ARCHITECTS.  
BURNS & JAMES  
ARCHITECTS.



the University of Virginia and at Marymount College, Tarrytown, New York.

The women's dormitory building at Virginia roughly follows an "H" pattern. Planned for 108 students, there are sixteen single and nineteen double rooms on each of the first and second floors. A guest room is set aside on each floor, also. An additional lounge is on the first and second floors, adjacent to the kitchens. Laundry chutes run down to the soiled linen room in the basement. Since an elevator was installed for student use, it was found practicable to design it to serve the attic which will be used for storage purposes.

The women's dormitory provides much more space for social activities than will be found in the men's quarters. Tradition and natural social relationships explain this. Women entertain at home. Their male friends come to their residential halls as guests. They entertain girl friends, too, as they would in their home environments. It is for these reasons that there are on the ground floor a large recreation room; waiting rooms; meeting rooms; two lounges—one for day students; and two "date" rooms.

The mail room is located near the entrance at this level as is the housekeeper's suite, which consists of a living room, bedroom, bath and kitchen. The housemother's suite, providing similar facilities, is also located on this floor. Other space is devoted to showers, toilets, a soiled linen room, laundry, mechanical room, etc.

A somewhat similar situation exists at Marymount

College where the newly constructed dormitory, Gailhac Hall, houses 216 students. Although social facilities existed in other buildings at Marymount College, including a large and popular tea room, provision had to be made in the new dormitory building for off-time or week-end activities. A "snack" kitchenette, sun decks on the fourth floor, two lounge rooms, a bookshop and similar facilities answered this need.

The dominant building on the campus is Butler Hall, flanked by Gerard Hall on the north and the Science Building on the south. All of these buildings are in French Renaissance style and were built when costs were much more reasonable than they are today.

#### Construction Features

Faced with the problem of designing a building in harmony with these three, in a period of almost prohibitive costs, we decided that stonework could be kept to a minimum and, where used, could be reminiscent of the style of the neighboring group. This concept carries out the color scheme effectively, yet meets practical problems of cost. The new building looks as if it "belongs," yet it has proved as economical to build as present circumstances permit.

The structure is a steel frame with two-way tile arch and concrete slab construction. The soil is sufficiently good to allow the use of spread footings. Exterior materials are Swenson Pink Granite, Buff Indiana Limestone, and a buff brick bordering on an orange tone. The base course at grade and the west



terrace are of granite, like Butler Hall. The main entrance doorway, which is the only ornamental feature on the west facade, and a few simple band courses, cornices, etc., are limestone. The brick is laid in Flemish bond. All exterior windows and doors are of wood, except roof doors which are of metal.

The building has a four-story central portion with three-story wings north and south of it. Stairs separate the three parts, and are expressed on the exterior by pylon-like towers.

In general, interior arrangements are similar to other dormitory buildings at the college; each pair of rooms is connected by a bathroom. In this building, all bathrooms are interior rooms, mechanically ventilated so that the full perimeter of the building is utilized for windows lighting the bedrooms. Rooms have tinted walls with matching tiles in the adjoining bathrooms. All single rooms, of which there are ninety, are in the three-story wings; all double rooms, numbering sixty-three, are in the central portion.

The ground floor is not a "basement" in the usual sense. The terrain, for example, permits wide windows for fine outdoor lighting in the recreation room or lounge. In fact, two highly desirable spaces that were originally unassigned have been converted into two classrooms, one for interior decoration, another for a secretarial course. Both are at grade with excel-

lent window views from the promontory that the building occupies. We took full advantage of the grades in planning these rooms.

Under the south wing is a large recreation room. It is in the process of decoration and promises to be an attractive lounge.

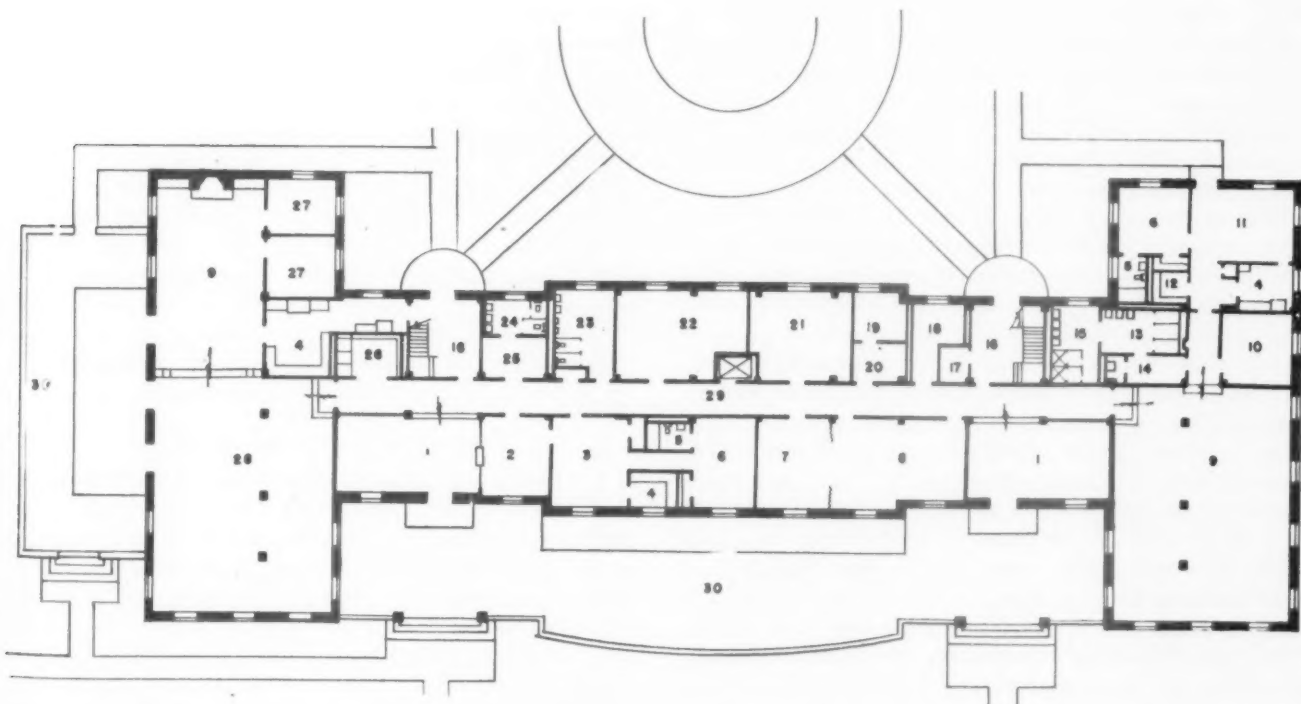
The main portion of the central unit is given over to the heating plant, which has been designed for future extensions. Other spaces in this portion are allotted to a laundry and ample storage space for trunks and equipment. In this group of rooms is the small "snack" kitchen, designed for use by the students in off-hours or on week-ends when they will enjoy a cup of tea or a sandwich with friends.

The part of the basement under the north wing includes the two classrooms and another lounge.

All parts of the ground floor, except that in front under the main terrace, have natural light and ventilation.

On the first floor at the front entrance are an office on the north side and a reception room on the south. Both open from a sun-sprayed lobby from which a graceful, double stairway leads to upper floors. Large windows at each landing present landscape views for miles.

On the main floor in the rear of the building opposite the reception room are two guest rooms, each



1. Entry and waiting
2. Office
3. Housekeeper's living room
4. Kitchen
5. Bath
6. Bedroom
7. Storage
8. Meeting room
9. Day students' lounge
10. Day students' locker room

11. Housemother's living room
12. Closet
13. Toilets
14. Vestibule
15. Showers
16. Stairs
17. Soiled linen
18. Male help's toilet
19. Locker room
20. Female help's toilet

21. Laundry
22. Mechanical room
23. Men's toilet
24. Women's toilets
25. Powder room
26. Mail
27. Date room
28. Recreation room
29. Corridor
30. Terrace

with a private bathroom. The remainder of the floor is dormitory space, as are all the floors above.

The building is equipped with a self-service elevator, and at each floor adjacent to the elevator is a supervisor's bedroom.

The bedrooms are ample in size. To save space, each single room has a built-in wardrobe. Each double room has two such built-in units.

From all front rooms are views for many miles of the widest stretches of the Hudson River. From all of the rear rooms, the Tarrytown lakes, rolling hills, and diversified scenery of Westchester County may be seen.

#### Military Dormitory Problems

While certain characteristic problems recur in the planning of all dormitories, a military academy presents at least one special situation not to be found in most other institutions of learning. Since the routine of military schools tends to be standardized, it is possible to be more precise in planning dormitory facilities for them than for others.

The new dormitory building for the Cardinal Farley Military Academy, Rhinebeck, New York, will provide compact, comfortable and complete living accommodations for 96 boys.

The building will stand alone as long as it meets current needs, but it is to become eventually one wing of the three-section building. The symmetrical future wing, when completed, will double accommodations for students. A proposed connecting unit between the two dormitory wings will be an academic building. Its construction will ultimately relieve the present academic and administrative office building for augmented administrative purposes, and provide additional faculty facilities.

The dormitory building plan therefore meets all present needs but contemplates a pattern for future growth of dormitory facilities, administrative, and academic needs.

On the ground floor, the 75-foot long dining room is planned to seat military units at each table. Since service is provided at the table, the kitchen and other facilities are not designed for cafeteria-style operation. Accordingly, in addition to the complete kitchen, space is set aside for serving, handling of dishes, trays and other utensils.

Although the dining room, recreation and reception rooms are on the lowest floor, they have ample natural light and ventilation. This was achieved by taking advantage of the natural fall of the terrain. They are a full story below the grade of the future court for the three-section building, yet they are on an exposed slope of the hill and thus receive natural light. All assembly rooms on this floor are acoustically treated.

A steel frame structure with flat roof, the new dormitory has four stories on one side and three on the other.

Of contemporary style, the building will have red

brick walls with large aluminum sash windows. A terrace is formed by the roof of the reception and recreation rooms, level with the grade to the rear of the building.

#### Current Trends in Design

Since the core of the dormitory is the student's room, a view of the room plans of recent dormitories may reflect current trends.

One of the questions that was clearly answered in the Marymount College dormitory was whether it is practicable to have built-in furniture and still retain opportunities for individual expression of ideas in interior decoration. To obtain maximum use of cubage from floor to ceiling, wide built-in closets with rolling doors from end to end were planned. The depth is no greater than arm's length, making every inch useful. Compactly designed, the closets provide a stack of convenient drawers, shoe racks, adequate space for hanging clothes, including long evening dresses, and shelves for storage of miscellaneous items.

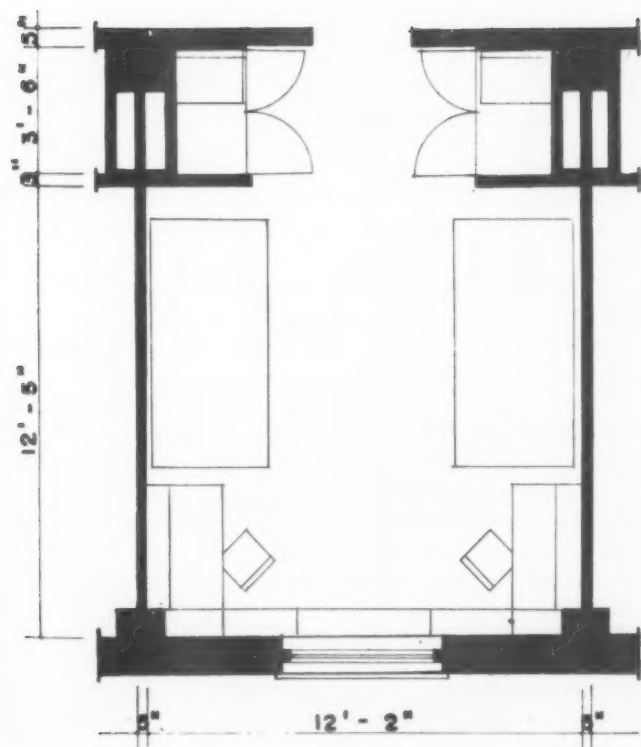
Each girl at Marymount was provided in both single and double rooms with her own night table, chair, desk and bureau. New furniture was designed smartly in steel, and in several color groups including burgundy with ivory paneling, green, blue, and a popular combination called "silver mist," featuring silver gray with a blue background. As a practical matter, it was quickly seen that when the students moved in, they applied their own imaginative treatment to the rooms, unhampered by either the built-in closets or steel furniture. Drapes, additional chairs, pictures, and personal items gave the individual touch to each room. All walls are plastered.

Similar treatment of wardrobes prevailed in the planning of the women's dormitory at Indiana University where built-in closets are installed in all rooms. Vanity, bed, and desk are provided for each girl on one side wall of single rooms. A chest of drawers is also provided on the other side of the room. A sink in a small adjacent room is shared by two rooms. Single rooms are 10 feet by 13 feet. Arrangements for students in double rooms are virtually the same.

#### Maximum Use of Room Space

Rooms in the women's dormitory at the University of Virginia follow a similar pattern. Adequate closet space is provided in each room for each girl. A desk, chest of drawers, easy chair, and night table are standard for each student. Asphalt tile flooring is used and the exposed block walls are painted. Concrete ceilings are exposed. Single rooms are 11 feet by 14 feet. There is only slight difference in accommodations in double rooms where it was possible, because of the arrangement of the beds, to provide a bookshelf and light over each bed.

Indiana University provides both single and double rooms for men in its new building. Built-in furniture utilizes maximum space. Asphalt tile floor with a rubber base was applied in all buildings. There is a



Floor plan of double room in men's dormitory, University of Virginia.

linowall wainscot around beds. The concrete ceiling is exposed. Built-in towel cabinets were installed at room entrances. Each student has substantially the same facilities, whether he is in a single or a double room. Single rooms are  $11\frac{1}{2}$  feet by 12 feet.

At the University of Virginia, the new men's dormitory provides double rooms only. These feature a built-in wardrobe. All rooms are equipped with desks and bookcases for each student. Wainscots are of linoleum above which striated Weldtex is applied on partitions. Rooms measure 12 feet by 16 feet.

The problem of gaining maximum use of room space is answered in a somewhat unique manner at the Cardinal Farley Military Academy. Since military schools prescribe the attire of all students, it was possible to determine readily exact requirements of clothing space. Built-in closets or cabinets are designed for maximum utility and within minimum area. Since military clothing inspection is part of the school routine, the cabinets are planned for quick view and ready access.

Wardrobe arrangement is compact, but it still permits an additional four drawers. One of each may be assigned to each student for personal, non-uniform belongings.

The entire plan for the building was developed around a single unit, a typical student bedroom. This



unit accommodates four students. Double-deck bunks, one on each side of the room, save space and simultaneously meet the administrative requirements of the school. Two lavatories are provided for each room.

The bedroom layout, with furniture, is designed as an entity. Eight bedrooms are located on each floor. The student bedroom with its double-deck bunks makes it possible to install closet space under and around bunks. A study table with four chairs in the center of the room will be used primarily for personal correspondence, since regular study work is carried on elsewhere in the academy.

Light colored slag block walls of comparatively smooth texture are left exposed above the built-in furniture which serves as a continuous wainscot about the room; applied finish occurring only at the lavatory recesses where tile board provides a sanitary, easily maintained surface. Flat concrete slab ceilings are left exposed.

#### Room Size in Relation to Social Facilities

While generalizations are as risky here as elsewhere, room size should be related to availability of recreational, study, or social facilities elsewhere in or near the dormitory. In women's dormitories, when abundant recreational space is provided and there are rooms for social and study activities, individual room area is not as important as it might be where such facilities are lacking.

Built-in furniture seems to prevail in favor, though there are some who object to its uniformity. But the majority view seems to be that built-in furniture is less expensive in the long run and saves maintenance costs. Almost universally, well designed built-in furniture is accepted as a great space saver. At the Cardinal Farley Military Academy it was possible to utilize every inch of space advantageously. At Marymount College, we used built-in furniture without in the least impairing the individuality of the occupants of the rooms.

The bedroom is, after all, the primary unit in the design of a dormitory. When social activities and space for other purposes is set aside, these are secondary basic units. Orientation of the rooms casts the building itself. In fact, the decision to include toilet fixtures, or to provide single or double rooms, or both, are considerations that shape the final building.

Obviously, the cost of dormitories is a serious consideration. Authorities seem to be in agreement on how they wish the money to be spent. They are concerned with facilities rather than ornamentation. Money that can be spent to provide more space to round out the resident lives of students is being spent for such purposes. Serviceability is also stressed in modern dormitories as it is in modern homes.

#### Reasonable Cost Per Student

Cost comparison based on the cost per student is helpful but not necessarily conclusive. Costs vary in

different sections of the country. The amount of equipment installed, etc., is never the same for any two dormitories, and some factors in the evaluation of dormitories are exclusive of cost.

The cost per student at Cardinal Farley Military Academy is expected to be about \$2,600.\* Cost per student at the University of Indiana was \$3,180. Both dormitories include complete dining facilities. Partial reasons for the difference in cost are:

1. Cardinal Farley has four students to a room. Indiana has single and double rooms.

2. Recreation and social facilities at Indiana University are much more extensive than those at Cardinal Farley, which is natural considering the character of the two schools.

Where dining facilities are provided outside the dormitory, the cost will naturally be less. This is the case at the University of Virginia, which will cost about \$1,520 per student.

Generally speaking, women's dormitories are more expensive than men's. The new dormitory at Marymount cost \$3,700 per student. A good portion of this cost may be attributed to the fact that Marymount College is situated in an expensive building region.

These figures on our own projects may be brought into clearer focus by comparison with some other dormitory costs. Some intentionally low-cost dormitories for men and women at the University of Vermont were built, respectively, for \$1,285 and \$1,350 per student. These costs naturally do not include dining facilities. This most probably represents the minimum cost for recent dormitory construction. The other end of the scale may well be the new men's dormitory at the Massachusetts Institute of Technology, which cost approximately \$7,000 per student including complete dining, social and recreation facilities. This \$7,000 includes every bit of equipment and furniture.

Allowing 20 per cent for the cost of furnishings would reduce this cost, for comparison, to approximately \$5,600 per student.

When we consider other current trends in dormitory design, we are bound to consider also that the final product will reflect the objectives and conditions of each college or university.

Objectives involve somewhat more than the universal desire for "congenial livability." What if a college already has ample recreational facilities? What if its dining arrangements are sufficient to meet current and perhaps limited future needs? Should these be duplicated in a new dormitory building?

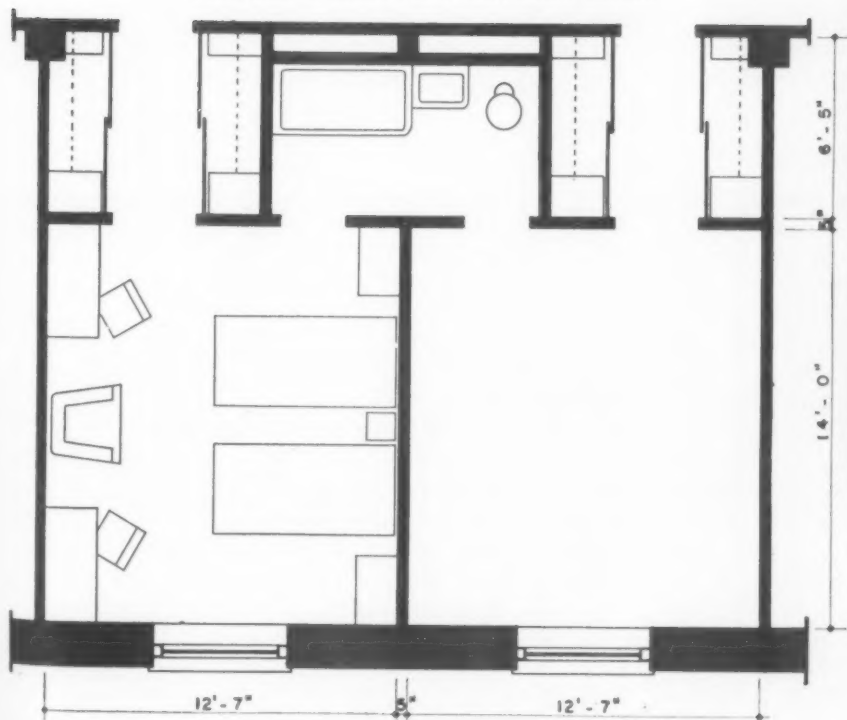
Among the many conditions that influence dormitory planning is, of course, the inevitable matter of cost. To what extent and how great is the subsidy? While it is true that the dormitory construction dollar can be stretched through careful selection of materials, scientific planning, or other devices, its elasticity is

\* Cost per student includes equipment and built-in features, but not movable furnishings, except where noted.



*Eggers and Higgins, Architects*

Floor plan of double room, Marymount College.



Photos show two arrangements of double rooms for girls at Marymount College.



Kitchen in Marymount's dormitory is informal and homelike and a favorite gathering place.

not limitless. Nor can the inspiring scenic panorama from Gailhac Hall at Marymount College be procured by any expenditure of money alone.

#### College and Architect Must Cooperate

If there is any one key to getting the most for the dormitory construction dollar, it is close cooperation between the college—and that means everyone who is concerned with the dormitory—and the architect. The evolution of dormitory plans will reflect the institution's aims and the architect's ingenuity and skill in direct ratio to their cooperative effort. While this is equally true of other college and university projects, the dormitory differs from other buildings in somewhat intangible ways. As a residence hall, its tone is social; its objective is comfortable housing. Small touches make a great difference in atmosphere. They are elusive because they are often not measurable. Another aspect of the dormitory is the necessity for welding its service into the social life of the campus. While availability of funds may often dictate scope and variety of recreation facilities, an intimate understanding of what the campus has, or needs, helps to plan a better dormitory.

The dormitory presents a greater challenge because of the inevitable repetition of its primary unit—the bedroom. When one considers the urgency of standardization in dormitories, both from the point of view of initial construction cost and later maintenance cost, it is a high tribute to the inventiveness of college authorities and architects that so many of our dormitories are as attractive as they are.

#### Basic Planning Considerations

Despite the pressures of such influences as conditions and objectives peculiar to a specific college, or even the problem of limited funds, we can readily find a number of basic considerations:

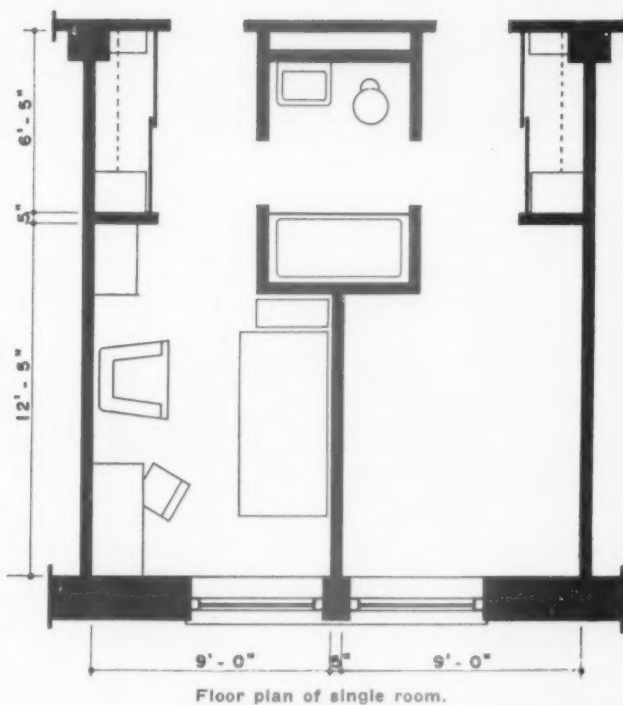
1. Close cooperation between college authorities and the architects is essential. This means more than agreement on general principles. It includes mutual understanding and agreement on even the minutest details. This working-together process will, in the long run, be reflected in the finished building.

2. Built-in furniture is generally desirable and all possibilities for its use should be studied. It is easy to maintain. It achieves maximum space utility with minimum space consumption. Built-in furniture can





Built-in closets and drawers shown at right are designed for maximum utility while consuming a minimum of space with the help of sliding doors. Lovely blond furniture in bedrooms, shown below, may be arranged to suit individual girl's taste.



be so designed and installed as not to impair the individual's expression of personality in his or her own room.

3. The residence hall should be conceived as part of a master plan for the college, even where a formal master plan as such does not really exist. This means that the dormitory must be located conveniently in terms of the location of classrooms, athletic facilities, dining halls and the like. Future requirements should be considered, so that enlarged enrollment and the need for more dormitory space has been taken into account.

4. Dormitories should harmonize with existing buildings. This does not mean that they must be of identical style. Use of the same materials as those in present buildings, and continuity of outdoor spatial relationships are ways to achieve harmony without repeating specific architectural styles.

5. Overall planning should give thought to an atmosphere of warmth and friendliness. Entrance halls give an important first impression and while they need not and should not be elaborate, they can be "homey" rather than institutional. Choice of materials throughout the building often affects the tone. This is an imponderable quality, often not susceptible to direct measurement and frequently not at all involved in cost.

6. Despite any restrictions as to cost, student rooms should be located to obtain the utmost advantages in

sunshine and natural light.

7. Careful appraisal of natural contours of the terrain often makes possible the use of ground-floor areas with natural light for augmented facilities such as recreation rooms, lounges, and shops.

8. Adequate quarters strategically yet privately located should be provided for house mothers, supervisors, or others in charge. Some kind of kitchen facilities are essential in women's dormitories.

9. General "livability" factors should be weighed, keeping installation of those items within the budget, such as acoustical treatment, adequate lighting, variety of furnishings, and even where space limitations are difficult, such minor aids to comfort as bed lights, bed tables or built-in bed bookshelves.

These, of course, are only a few of the areas that must be surveyed in each case, but they provide an indication of the thinking that should go into planning before, not after, the building is erected. Specific facilities in any dormitory building vary with the institution's needs. As already indicated, women's dormitories almost always require more space for social activities than men's dormitories. The presence of the words "date room" on many dormitory plans is ample evidence of the wide acceptance of this principle. The extent and nature of these facilities, however, cannot be determined without knowledge of the institution's needs and existing facilities.



Accent on "gracious living" pervades home-like atmosphere in the general lounge of the Men's New Halls at Indiana University.

## NEW BUILDINGS FOR MEN AT INDIANA UNIVERSITY

**R**ESIDENTS of the new men's halls at Indiana University in Bloomington are the envy of the campus. Their dormitories, most recent to be added, were built to accommodate the postwar influx of students with comfort and service.

The architects and designers, interior decorators and school authorities have recognized the concept that today's student is a social being and that he is at his

best scholastically, physically, and socially when he feels "at home." Colors, building materials and interior decorations all chosen to achieve this effect.

Helping to provide this homelike feeling, and also making the buildings practical from the maintenance viewpoint, is laminated plastic. This material has been used for table tops and service stands in the dining room; for the top and front of the long snack bar;





Central dining hall in the Men's New Halls serves over 1,000 men at a time and doubles as a ballroom for student dances.



Ample space for small and large group diners. Tan linen Formica table tops lend themselves to quick clean-up time.

for occasional and card tables in all student lounges; and for desk tops in individual rooms.

#### Interior Arrangement

The new men's halls contain 552 student rooms, in 18 units with approximately 55 men in a unit. Each unit has its own roof lounge besides the large general lounge in the central building. There are also four recreation rooms, laundry facilities, snack bar, library, individual mail boxes, and a check room.

The dining hall, largest single room on the campus exclusive of the auditorium, seats over 1,000 students.

Tables can be easily folded and carted away to turn the dining room into a dance floor that accommodates as many as five thousand students.

The unit lounges serve admirably for collar-and-tie events as well as sport-shirt-and-sweater card games, or just plain relaxing. They can be connected with lounges in other units for special functions.

#### Pleasing Decor

An eye-catcher in the main lounge is the cocoa and green flowered rug; furniture and drapes are done in plain greens, browns and yellows. The dining room



Snack bar in the Men's New Halls in Indiana University satisfies between-class appetites.



Student living quarters boast of individual closets, beds, study lights, desks, and study and lounge chairs.

is in three shades of beige. Student rooms are finished in solid colors: soft rose, blue, yellow and green.

The architectural style of the new living center is modern collegiate, which was developed by Eggers and Higgins of New York. Edward James of Burns

and James, Indianapolis, was the local architect and J. L. Simmons Company, acting as agents for the university, handled the construction. The Backus Brothers Company of Cincinnati were the interior decorators and furniture consultants.



# AMERICA'S OUTSTANDING SCHOOL BUILDINGS (BUILT SINCE 1945)

By WALTER D. COCKING and ROBERT L. HOPPER

American School Publishing Corporation

**T**HE QUALITY of a school building is determined in a large measure by the character and scope of the planning prior to its construction. Good school building planning starts with the educational program. Once the character and scope of the educational program are established a building can be planned to house the program and to meet the needs of the number of pupils to be accommodated.

Many communities throughout the country have found new solutions to housing school programs. These solutions go beyond the traditional conceptions of a school building. Spaces are designed for specific purposes.

School buildings can no longer be termed outstanding simply because building materials have been arranged in a beautiful fashion. Indeed, beauty is a product of a well planned functional building designed to house specific activities.

## Method of Locating Schools

As the people of various communities are confronted with the need for new school plants, they frequently ask where they can find new buildings which are considered good in design for housing a modern educational program. This question is raised in increasing volume in every section of the country. Now it is probably impossible to say with absolute accuracy that certain buildings are the best. Yet we know that some buildings are better than others.

Undoubtedly a number of factors assist in reaching the conclusion that a building is outstanding. Members of a state department of education probably know better than anyone else which buildings are considered to be the best in their state.

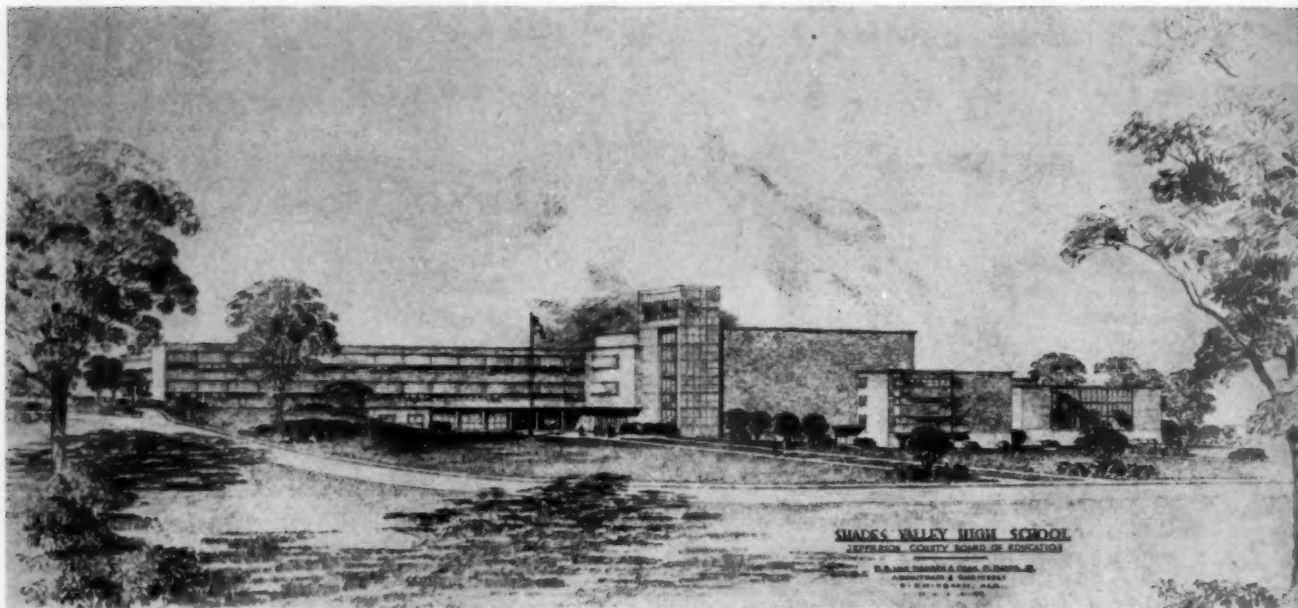
Proceeding on this assumption, we recently enlisted the cooperation of the state departments of education and asked them to list the six to ten outstanding buildings in their states constructed since 1945. All state departments cooperated (with the exception of one which did not submit a list because no outstanding new buildings had been constructed in that state). When the list was compiled it numbered 425 new buildings. Of these, 285 or 67 per cent were elementary schools.

The superintendent of each local school system in which one of these buildings was located was then requested to supply certain information concerning the building, including its three outstanding features. The results of an analysis of these data are included in this article.

## School Sites

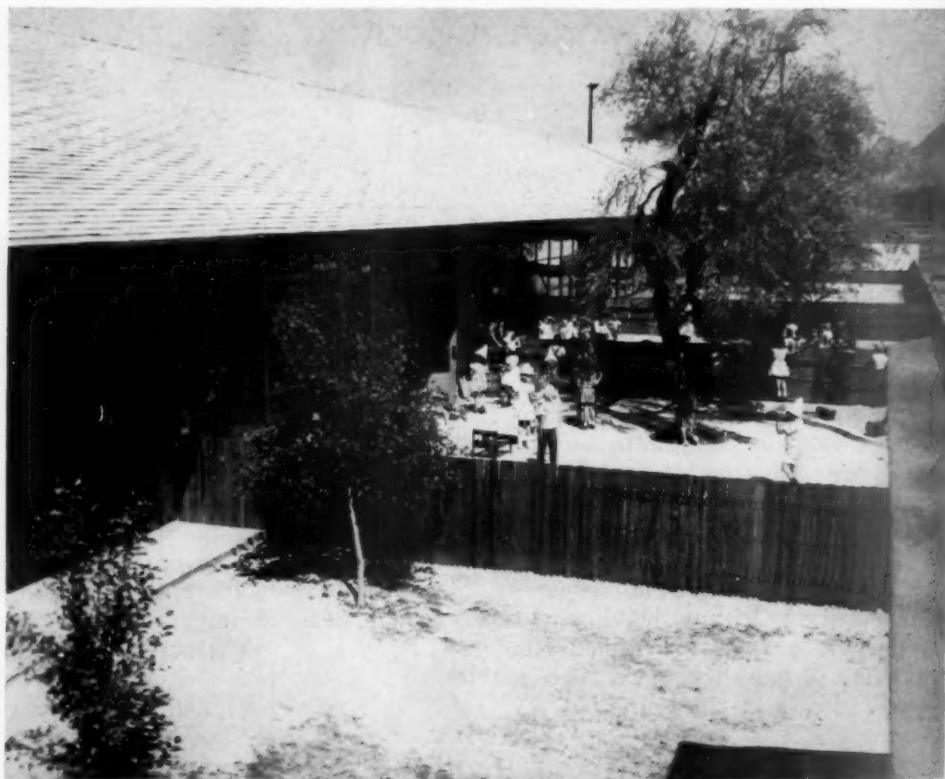
Fifty years ago the size of the school site was determined largely by the land area needed for the building. Since that time many formulas have been developed to determine desirable or minimum standards for sites.

Today such formulas are not considered accurate as



The proposed plan for Alabama's new Shades Valley High School. E. B. Van Keuren and Charles F. Davis, Architects.

The Madison Elementary School, Phoenix, Arizona, has erected separate outdoor play units which connect with classrooms. Gilmore, Varney and Howard Ekman, Architects.



a basis for determining the size of sites. The activities which are to be conducted at the school must be the deciding factors. For some communities a school site needs to be extremely large to provide a place for a variety of activities. For other communities with existing activity areas the school site may be smaller.

A divergent range in the size of the site is found

for the school buildings considered to be outstanding. For elementary schools, the site varies from 1 acre to 50 acres, with an average site of 8.7 acres. For secondary schools the site varies from  $1\frac{1}{2}$  acres to 51 acres, with an average site of 18.1 acres.

The range in size of site indicates that no formula is used. Perhaps some communities are too eager to

accept the most available site. Regardless of conditions, there is a definite trend toward communities obtaining larger school sites than in earlier years.

### Basements

In recent years basements for schools have begun to disappear. Serving no useful purpose, money expended for a basement is wasted. With recent developments in the field of heating, the boiler no longer needs to be lower than the heated floors. Air, water, and vapor can be forced mechanically to any part of the building. Actually a safety hazard is created by locating the heating plant below spaces used by children and adults because of the shift to the use of combustible fuel.

One argument for the basement is that it can be used for storage, but experience has proven that such use is not practicable. Materials and equipment stored in basements are too often difficult to reach. Inaccessibility means that tools of learning will not be used to their fullest extent. Basement space has been used for educational purposes even though it was not as suitable as other space. Such practice still prevails in most of our older buildings.

The majority of communities with outstanding school buildings seem to have taken these factors into consideration. More than 61 per cent of these buildings have no basements, and an additional 13 per cent have partial basements. Only 26 per cent of the outstanding buildings constructed since the war have complete basements.

### Number of Stories

For many years the American public has accepted multi-storied school buildings. The massiveness of the school in the community seemed to reflect the hoped for quality of the educational program.

Today communities are planning schools for people and programs. The hazards of fire and accidents are strong factors in reducing the number of stories and thereby eliminating stairways. The educational program is strengthened, and the emotional setting for children enhanced by the one-story structure. No longer can it be said that single-storied buildings necessarily cost more than multi-storied buildings.

Of the elementary schools considered outstanding, 77 per cent are single-storied structures. Only 23 per cent have two stories, and none has a greater number of stories.

A similar trend to reduce the number of stories is noted in the secondary schools. Of the secondary schools considered outstanding, 34 per cent are one story; 49 per cent two stories. Only 17 per cent of the secondary schools considered to be outstanding have three stories.

### Size of Schools

How large should elementary schools and secondary schools be? Formerly, it was thought that the larger the school the better the educational program would



Classroom interior of the Madison School, Phoenix, shows ample locker space. Each classroom has its own toilet facilities



This kindergarten in Phoenix contains the suspended unit type gas heater and a special built-in locker for each pupil.



Reversible light green chalkboard-corkboard and  $\frac{3}{4}$  plyboard side walls are employed in this Phoenix elementary classroom.





Little Rock, Arkansas, followed the trend to one-story structures when it erected the Benjamin Franklin Elementary School. Howard Eichenbaum, Architect.



The Benjamin Franklin School's classrooms are spacious, light and comfortable. Students have plenty of sea room.



A kindergarten room in the Dolores Street Elementary School, Carmel, California, has its own sink, movable furniture. Kump and Falk, Architects.

be. At the present time certain limits are accepted. For elementary schools, there should be a minimum of one teacher per grade, and a maximum of 450 pupils. Within this range a good educational program can be conducted efficiently.

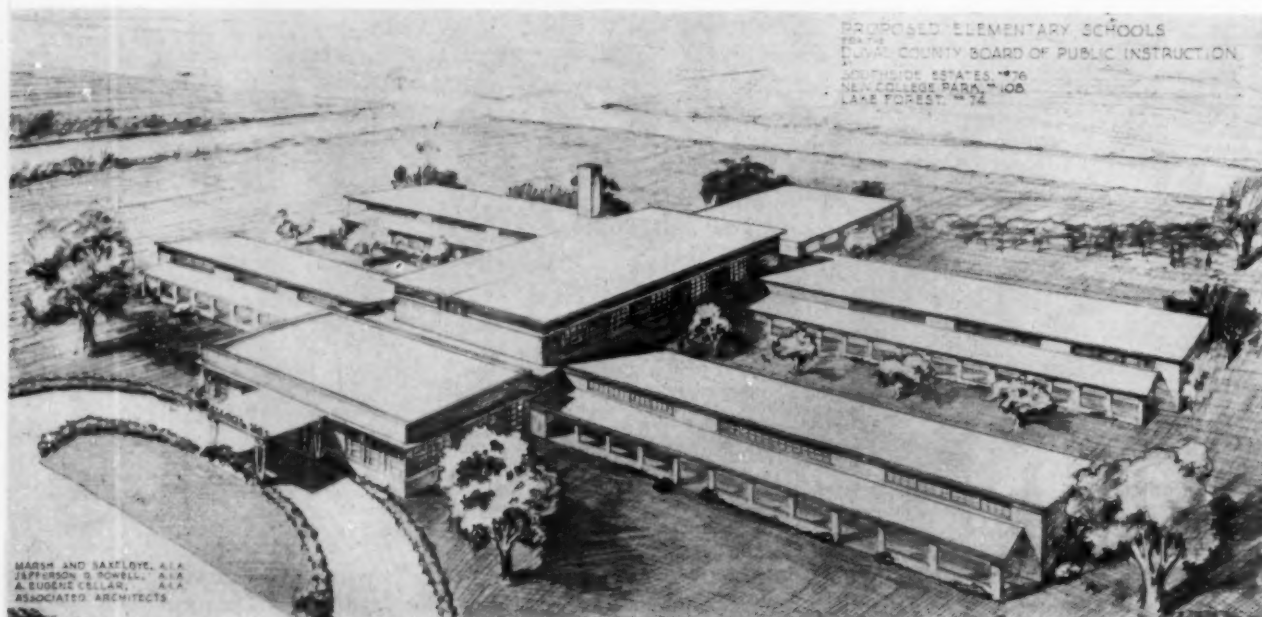
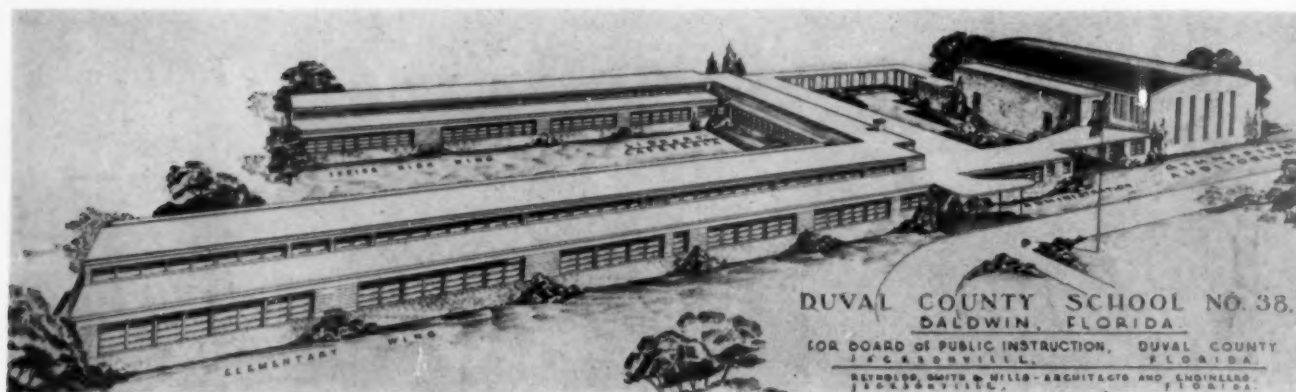
The elementary buildings considered to be outstand-

ing seem to follow this pattern. The average elementary school in the group has 13 rooms for 413 pupils. The range in number of rooms, however, is from two classrooms to 30 classrooms. The range in number of pupils is from 50 pupils to 1,050 pupils.

Communities would seem well advised to accept



Yalesville Elementary School, Yalesville, Connecticut.



Gainesville, Florida, elementary students feel as though they are working outdoors, winter or summer, because of the large, low-placed windows installed in classrooms. Sanford Goin, Architect.







Proposed plans for the Ashland, Maine, Regional High School.

a maximum secondary school enrollment of around 1,200 students if programs are to be planned to meet the needs of individual pupils. The average capacity of the secondary school buildings considered to be outstanding is 726, and the average number of classrooms is 25. The range in number of pupils is from 60 students to 2,500 students. The range in number of classrooms is from three classrooms to 63 classrooms.

An overall look at the country as a whole shows that the average capacity of the school buildings considered to be outstanding by regions is as follows:

## PUPIL CAPACITY OF BUILDINGS

	Elementary Buildings	Secondary Buildings
South	476	700
New England	333	422
Central	387	784
Middle Atlantic	337	938
Western	447	767

It is clear that in some communities schools of desirable size have not been obtained. Elementary schools and secondary schools with an enrollment of 50 to 60 pupils are difficult to justify from an educational or efficiency standpoint. To provide an adequate

educational program of services and activities for so small a number of children does not make an economical school unit.

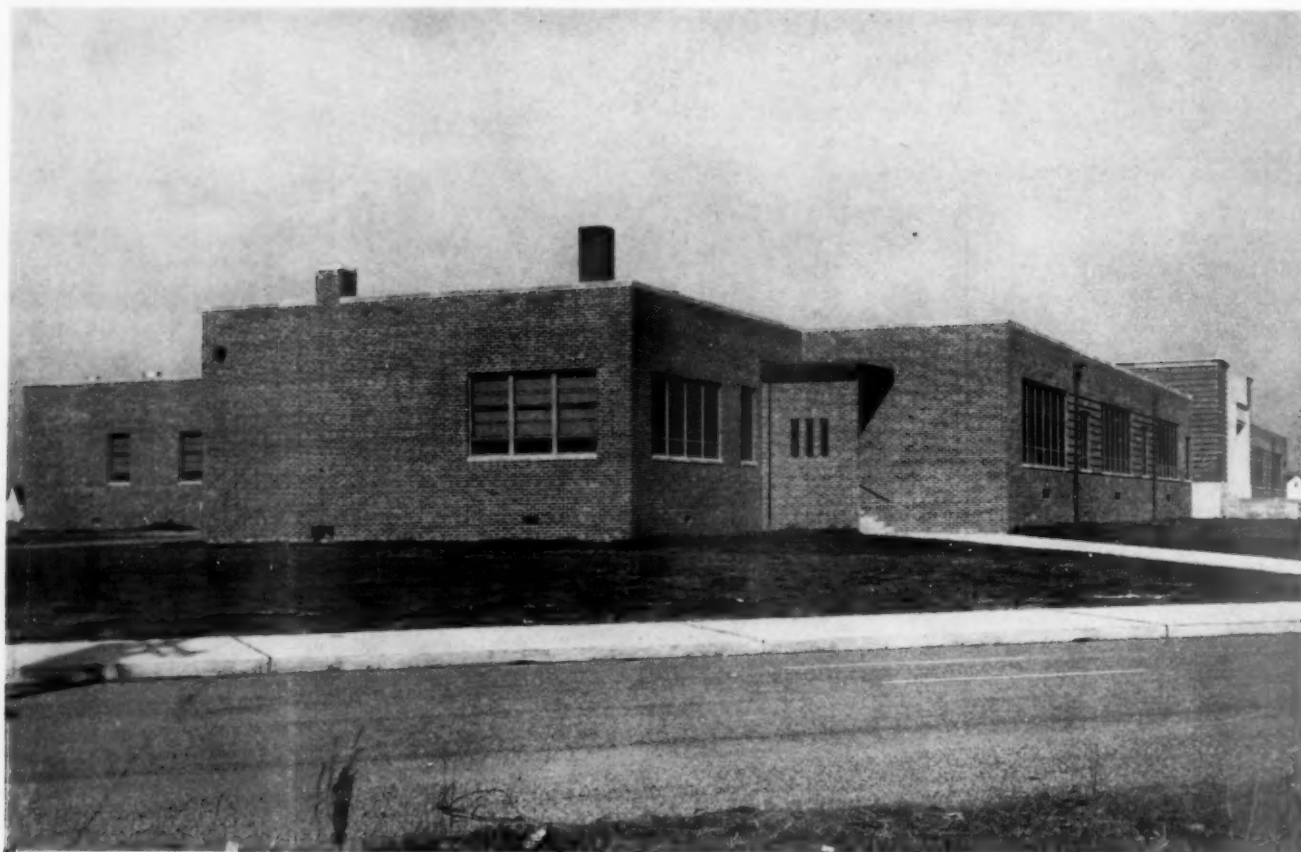
At the same time, the exceedingly large schools usually find it difficult to meet individual needs. Elementary schools with a capacity of 450 pupils and secondary schools with a capacity of 750, have probably reached a reasonably efficient level of operation. Any school of greater size will most likely find a decrease in personalized instruction without a proportional decrease in cost of educational services.

To find the best solution to this problem in each community, the citizens as well as the professional staff must enter into the planning. Definite educational objectives and programs must be developed prior to construction of new buildings.

## Cost of New Buildings

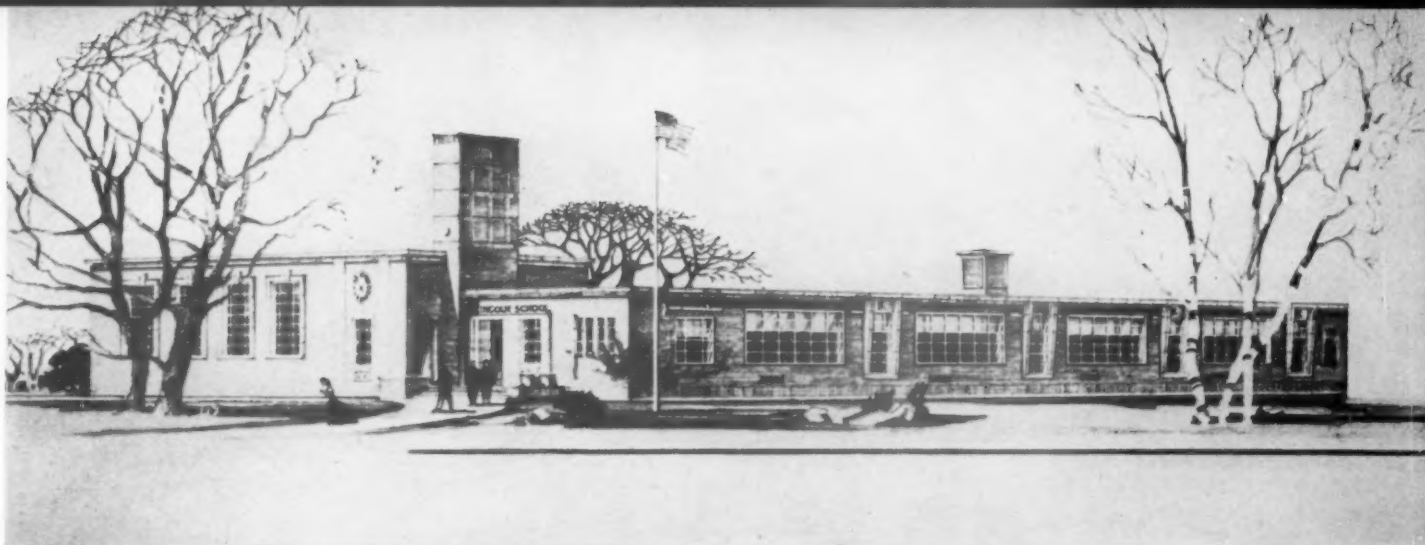
The cost of the average elementary school building considered to be outstanding was \$365,942. This cost was distributed as follows: site 4.7 per cent; building 89.8 per cent; and equipment 5.5 per cent.

In the average elementary school, the cost per classroom was \$28,149. Since this average cost does not distinguish between sizes of special spaces, such as playrooms, a more adequate measure is cost per



The Prince Street Elementary School, Salisbury, Maryland. (Floor plan below.) Malone and Williams, Architects.





Lincoln Elementary School, Natick, Massachusetts, another one-story structure. Kilham, Hopkins, Greeley and Brody, Architects.

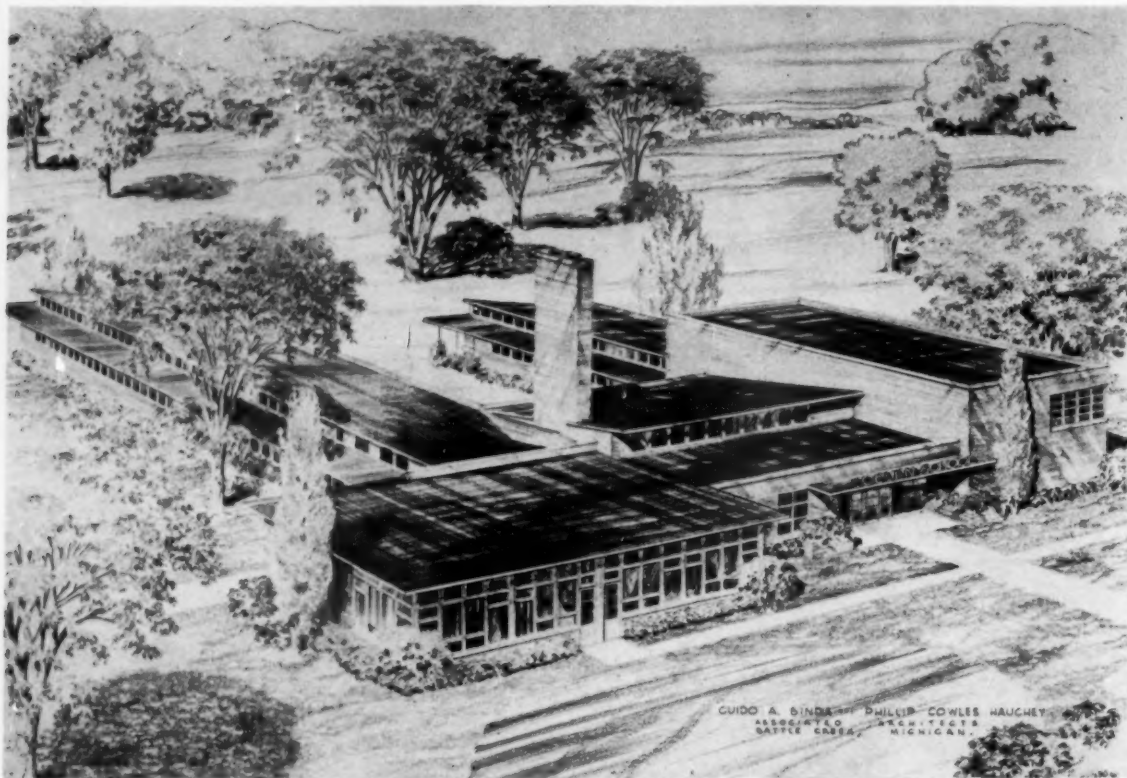


Glengarry School, Walled Lake, Michigan. Walter A. Anicka, Architect.



Another view of the Glengarry School shows interesting use of windows in wing to extreme right.



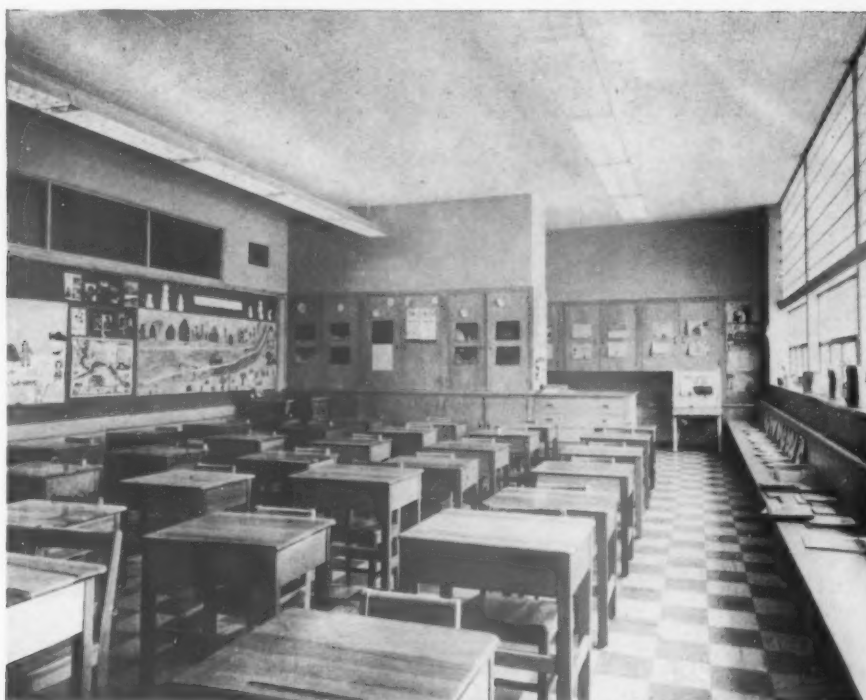


Proposed plans for Coburn School, Battle Creek, Michigan. Binda and Haughey, Architects.



The Horace Mann Elementary School, Rochester, Minnesota. Harold Crawford, Architect.

Horace Mann classrooms provide ample space for display of creative work.



Children are happy in the Horace Mann kindergarten because they have plenty of room in which to play.

pupil. For all elementary schools considered to be outstanding, the average cost was \$886 per pupil. The cost per pupil in the five major regions was as follows:

South	\$ 668
New England	1,192
Central	954
Middle Atlantic	1,198
Western	843

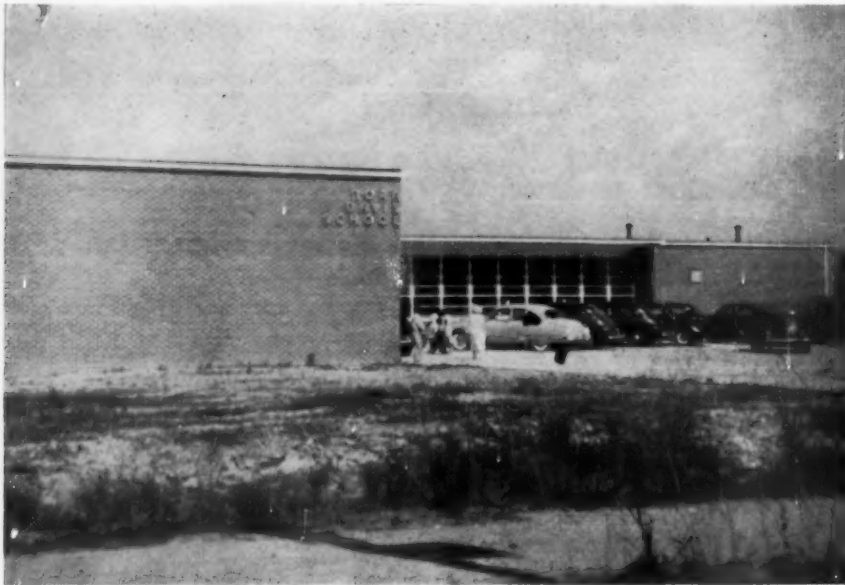
The cost of the average secondary school was \$796,388. The cost was distributed as follows: site

3.8 per cent; building 87.6 per cent; and equipment 8.6 per cent.

For all secondary schools considered to be outstanding the cost was \$1,097 per student. The cost per student in each of the five regions was as follows:

South	\$ 859
New England	1,390
Central	1,158
Middle Atlantic	1,661
Western	1,197

The most significant conclusion which may be drawn



The Nora Davis Elementary School,  
Laurel, Mississippi. Chris Risher,  
Architect.

is that the cost per pupil in elementary schools and secondary schools does not vary greatly. Only in the middle Atlantic region does it vary more than \$250 per pupil. In this region the capacity of buildings varies most, from 337 pupils for elementary schools to 938 students for secondary schools.

The cost of the site for the outstanding school buildings is a relatively minor cost. Only 4 per cent of the total cost was expended for sites, in spite of the fact that the majority of the buildings are one-storied and cover a relatively greater land area. Since the value of land does not depreciate as do buildings and

*Photo Courtesy Paigel Studio, St. Louis*



Reavis Elementary School, Affton, Missouri. Schmidt and Paolinelli, Architects.





New Jefferson Elementary School, Helena, Montana. Fred A. Brinkman, Architect.



The Webster-Garfield Elementary School, Butte, Montana. J. G. Link and Company, Architects.

equipment, large sites are probably the best investment that a community can make for its educational program. School districts would seem well advised to insist upon large sites which provide ample space for recreational and instructional spaces.

#### Movable Furniture Unanimous

The shift from fixed furniture to movable furniture is being accelerated by the new construction materials and techniques. With the advent of concrete floors with composition coverings movable furniture has become a practical necessity. Not a single school considered to be outstanding reported that traditional furniture had been moved into new buildings. Some schools which had purchased new equipment for old buildings moved it into new buildings upon completion.

Most of the capital outlay dollar goes into construction of the building. With almost 90 per cent of the money so spent, communities cannot take too seriously the problem of planning the new building. The record shows that buildings are usually used for more than 50 years, with the program conditioned in

large measure by the building. Only by planning for flexibility can a community construct a building which will continue to meet educational needs.

#### Features of Outstanding School Buildings

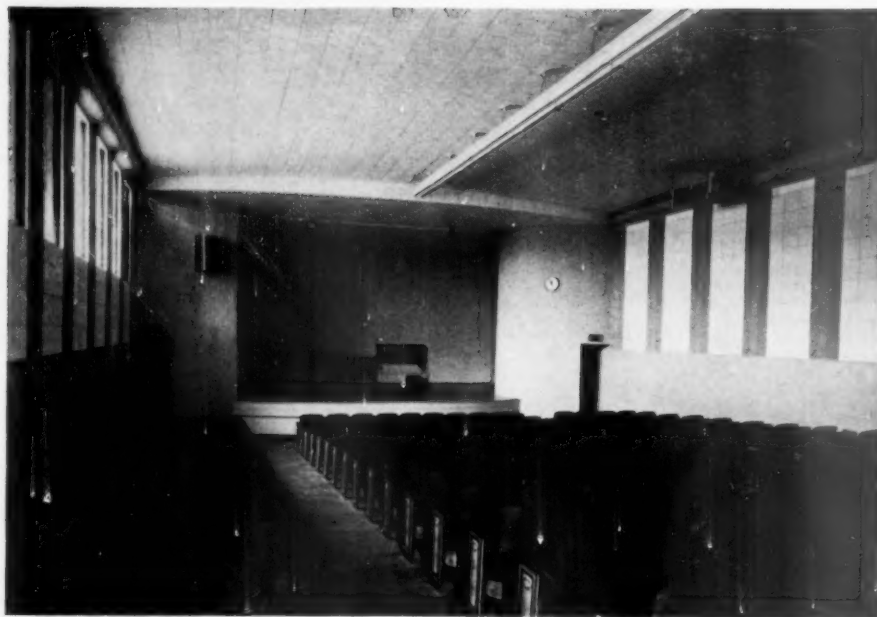
What are the features of the school buildings considered to be outstanding? The superintendents of 298 schools listed 1,004 features as outstanding. The following were most frequently mentioned:

		<i>Number of Schools</i>
<b>Educational Features</b>		<b>384</b>
Classrooms	162	
Community facilities	22	
Multiple use of space	35	
Physical Educational facilities	34	
Special units and facilities	118	
Equipment	13	
<b>Technical Features</b>		<b>243</b>
Acoustics	23	
Ceilings	10	
Heating and Ventilation	50	
Lighting	120	
Materials	40	



Classroom interior of the Webster-Garfield Elementary School, Butte.

The Webster-Garfield School's new auditorium has excellent acoustics.



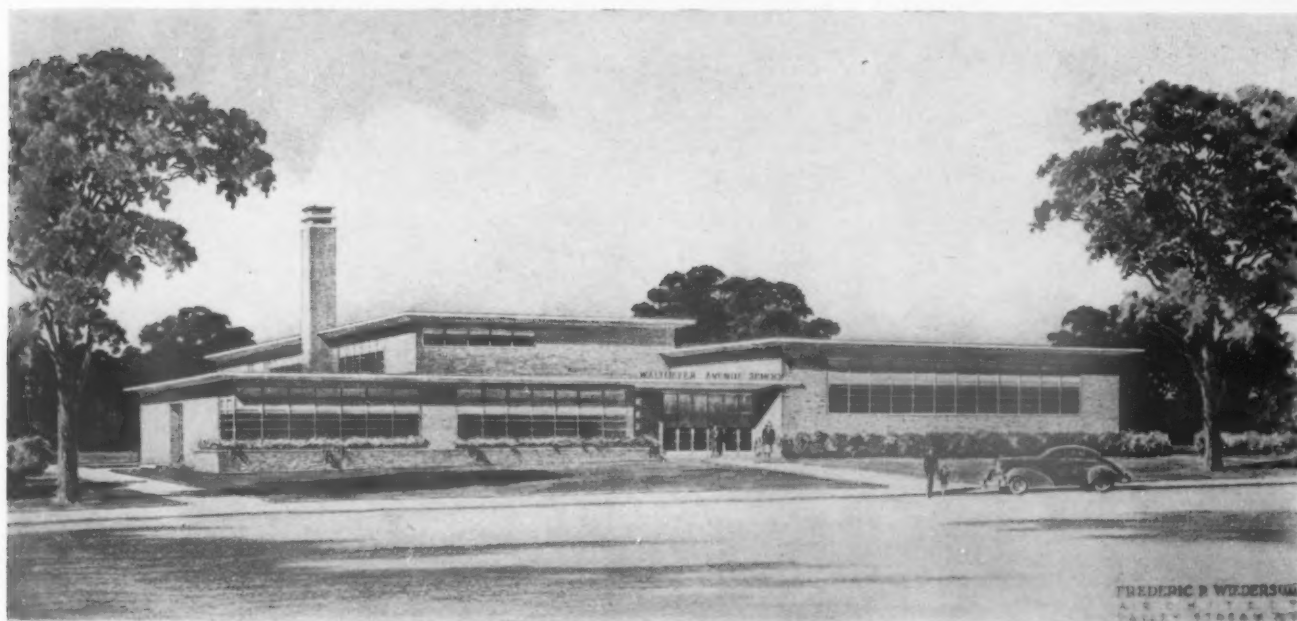
Design Features	Number of Schools	
	351	
Walls	5	
Corridors	9	
General Design	107	
Flexibility	54	
Relation of spaces	5	
One-Story buildings	171	
Grounds	26	
Playgrounds	10	
Site location	16	

Many communities have reason to be proud of the features which they have planned for their schools. Good examples are the buildings which have class-

rooms with more than 1,000 square feet of space. In these classrooms there is space for good teaching. Square rooms and movable furniture add to the usefulness of the entire room area.

Work spaces, sinks, and individual toilets for each of the lower grades are found in many schools. An outside entrance for each elementary classroom is found frequently in these schools.

The height of ceilings has been reduced to "child size," and acoustical materials have been used to reduce reverberations which have been so familiar in older buildings. Trim, chalkboards, floors, and walls have been decorated with materials of high light reflective qualities. Increased window areas and bilateral lighting have been used to improve daylighting;



The proposed plans for the Waltoffer Avenue Elementary School, Mineola, New York. Frederic P. Wiedersum, Architect.

numerous fixtures have been used to improve electric lighting.

#### Partitions and Special Spaces

Several buildings considered to be outstanding have movable partitions to promote flexibility. The communities in which these schools are located planned for today's needs, and at the same time made it possible for the buildings to be adjustable to the programs of tomorrow.

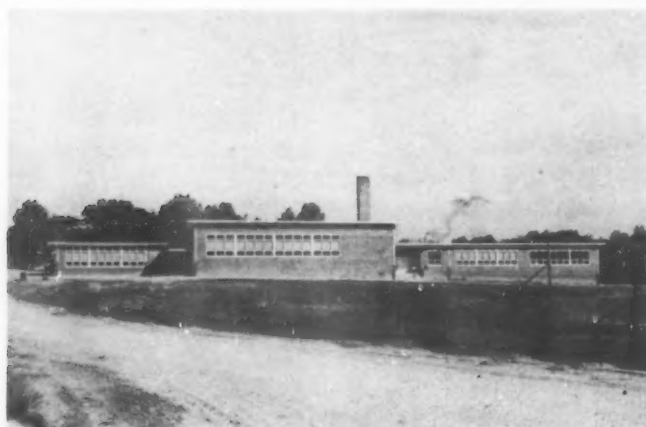
In these schools special spaces are provided for guidance services, health services, conference rooms for helping teachers, administrative services, and visual aids. In many elementary buildings there are, in addition, special spaces for home economics, shops, music, and libraries.

Spaces have been planned for multiple use in these

schools. "Multiple use" means use of a particular space for more than one purpose. The term is sometimes misunderstood. Particular activities must have similar space requirements if they are to be combined in a given space. This does not mean that an auditorium, which needs a sloping floor, can be used as a gymnasium or a hall for dances. It does mean that in an elementary building a multiple-purpose room properly planned can be used for eating purposes, playroom, or place of assembly for small groups.

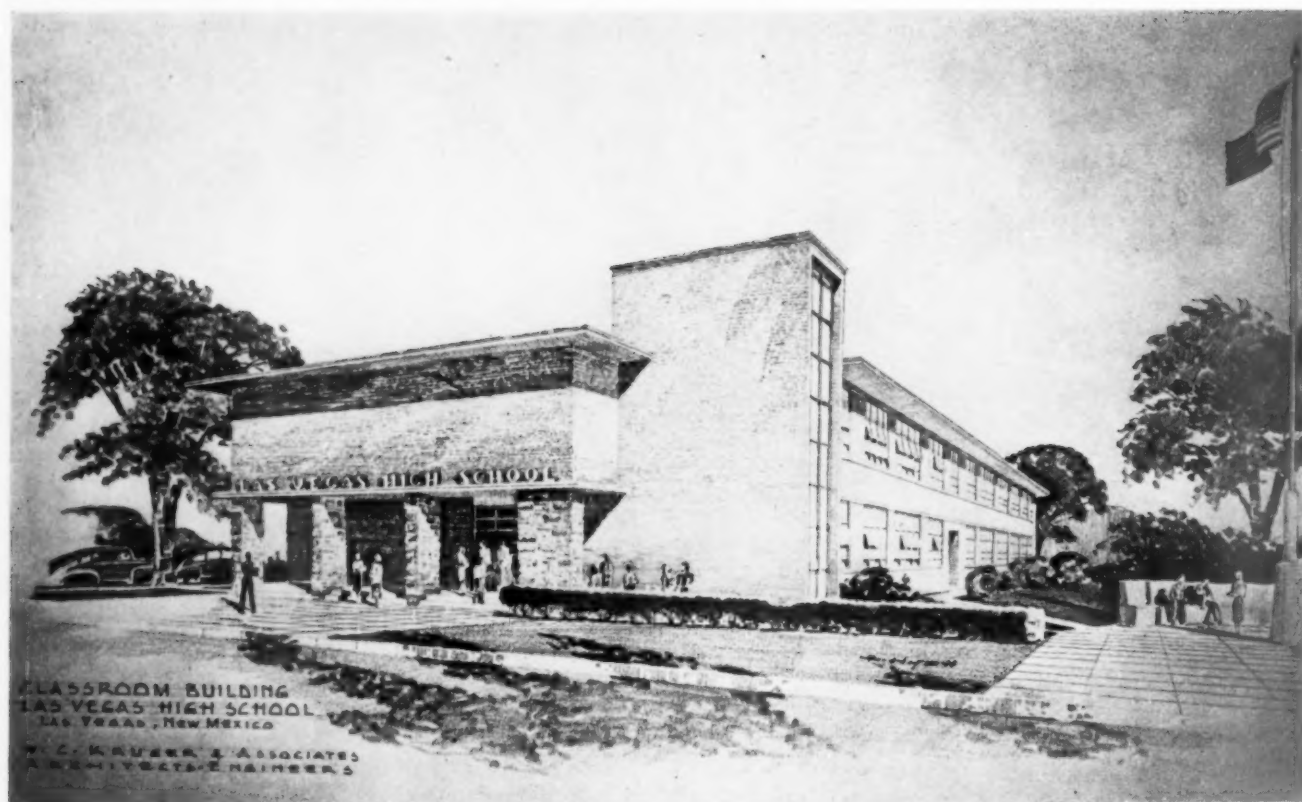
#### Thought for the Teachers

Features which appeared less frequently may prove to be as significant as the features listed above. Only two superintendents listed facilities for teachers as outstanding. This is in spite of the fact that com-



Concord, North Carolina, has two new elementary schools. Above left, the Shankletown School; right, the Royal Oaks School. A. G. Odell, Jr., and Associates, Architects.





The proposed plan for the Classroom Building, Las Vegas High School, Las Vegas, New Mexico. Kruger and Associates, Architects.

munities recognize the importance of a space where teachers may meet for conferences and relaxation. Business management has long recognized the value of such space to promote morale and working efficiency. Citizens need to plan facilities for teachers just as they plan living rooms for their own homes.

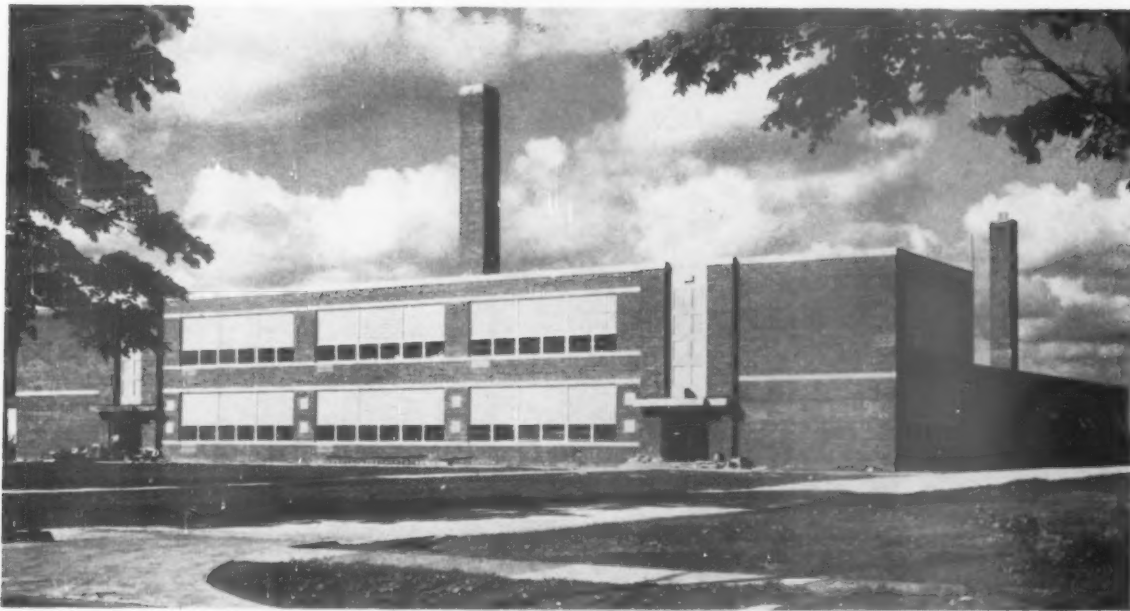
Most communities seemed to have taken for granted safety and low cost maintenance. Each of these aspects was considered outstanding in only three buildings. Undoubtedly most communities considered these factors, even though the superintendents did not list them as outstanding features.



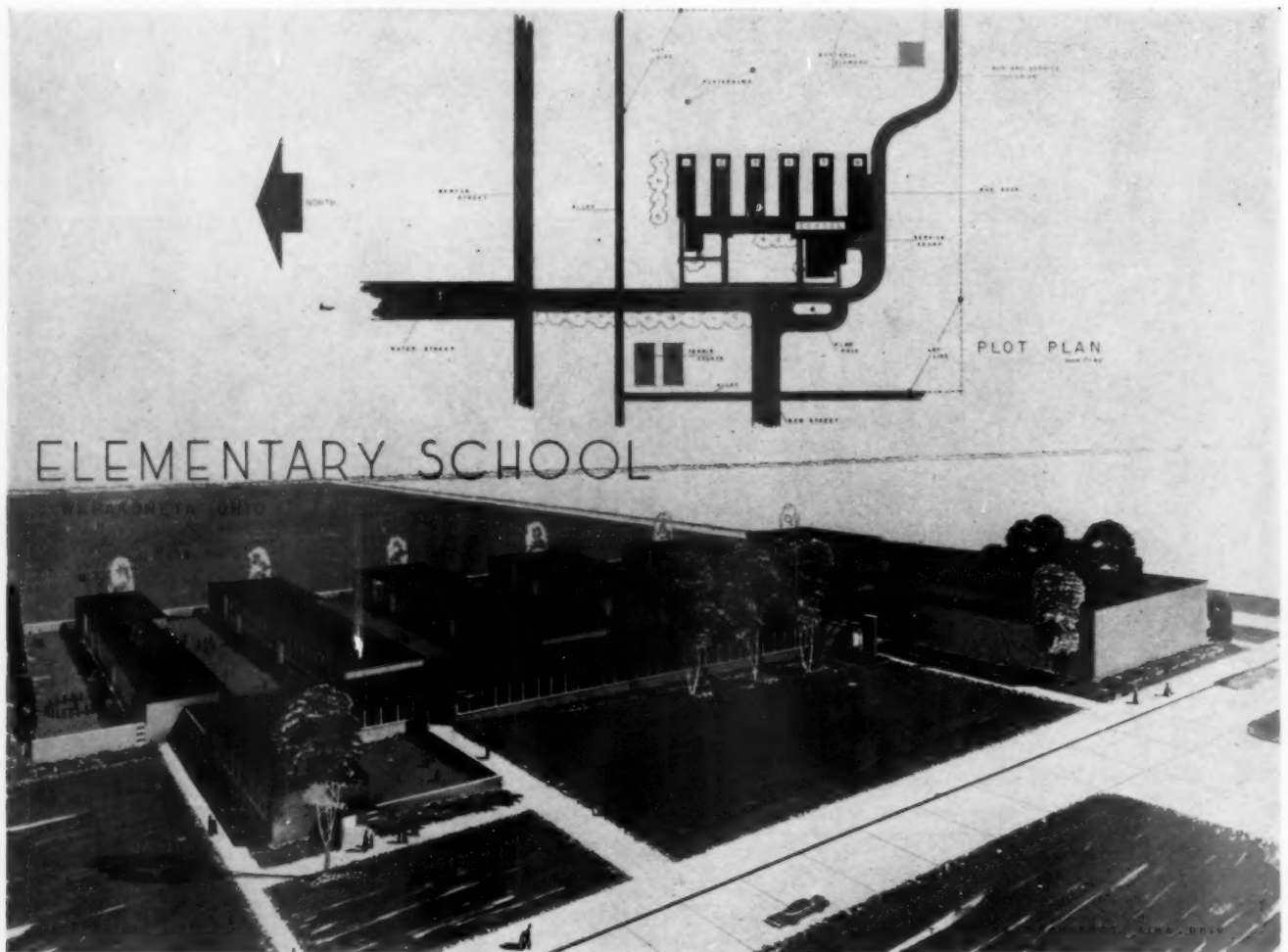
The Lovington, New Mexico, Grade School addition, erected in 1949. Schaefer and Merrell, Architects.



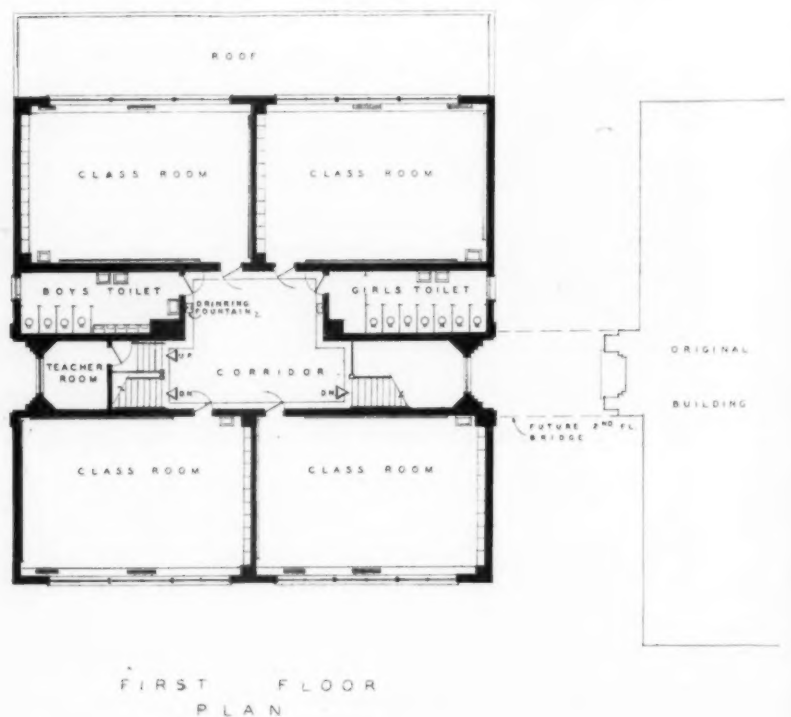
Veterans Memorial Elementary School, Reno, Nevada. Russell Mills, Architect.



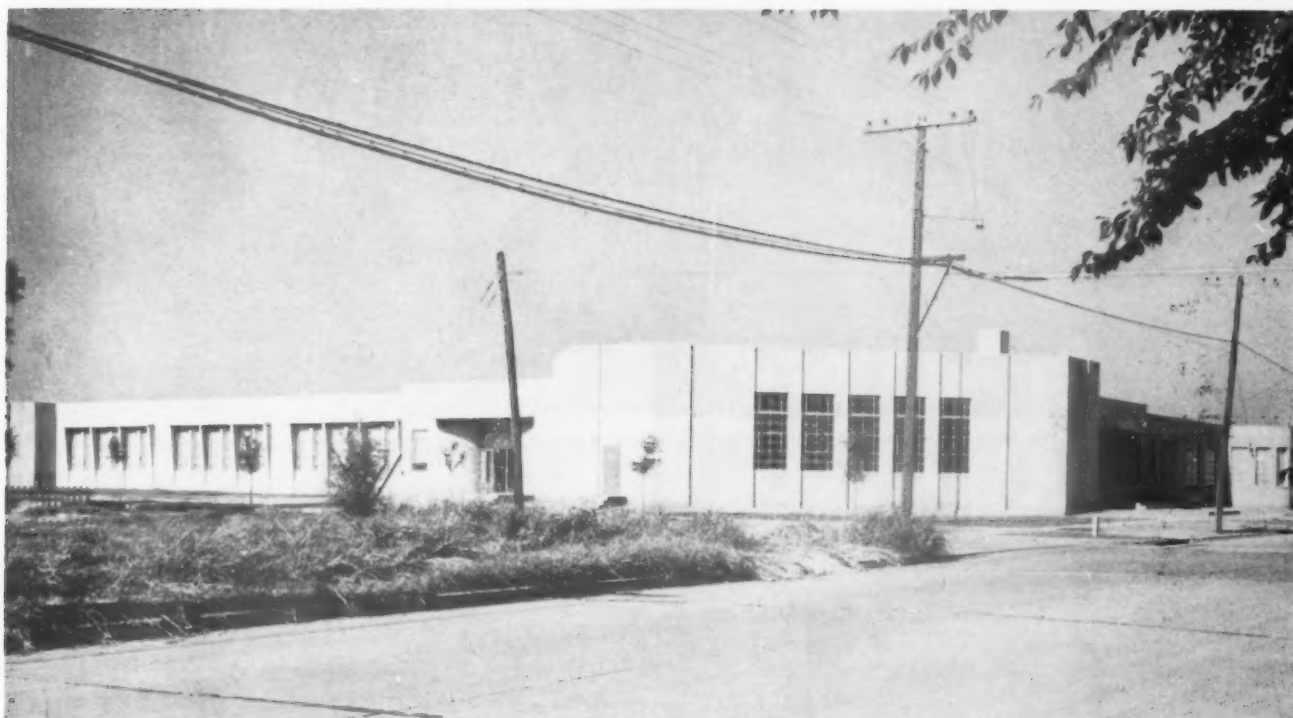
Westlake Elementary School, Westlake, Ohio. Fulton, Delamotte and Krinsky, Architects.



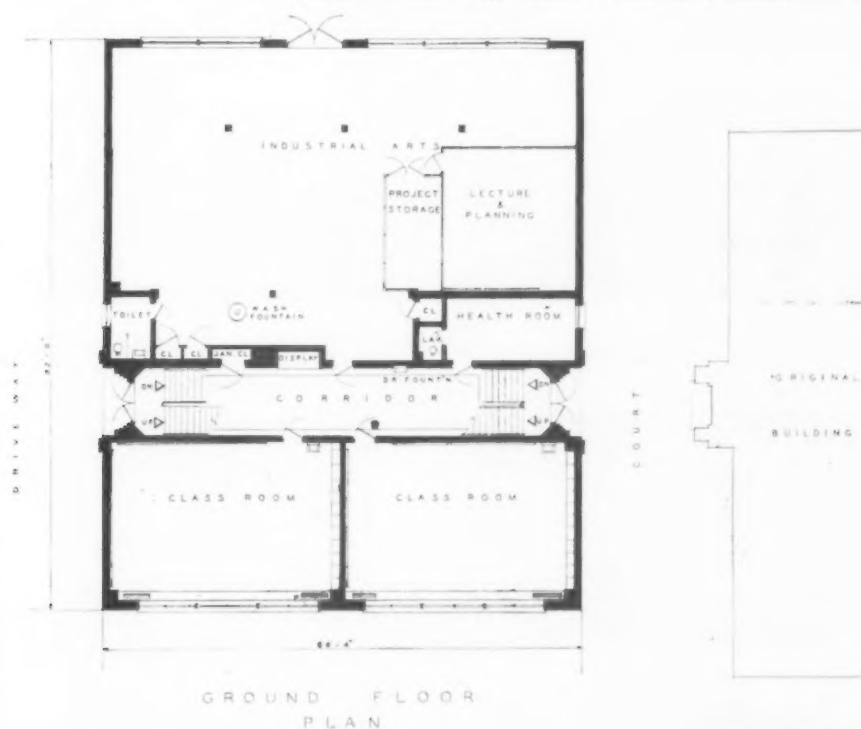
Floor plans show first floor and ground floor of Centralized School, Wadsworth, Ohio. William B. Huffer, Architect.



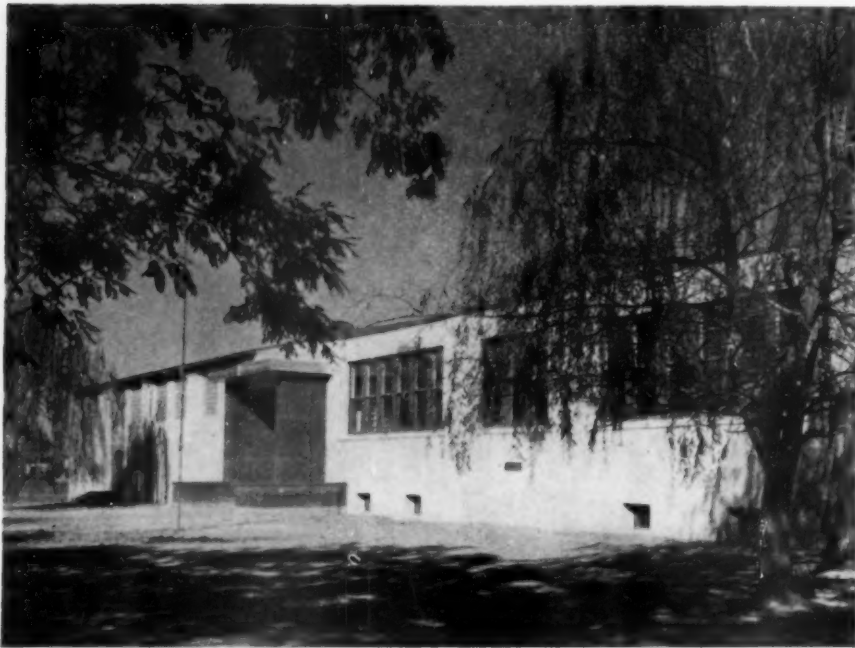




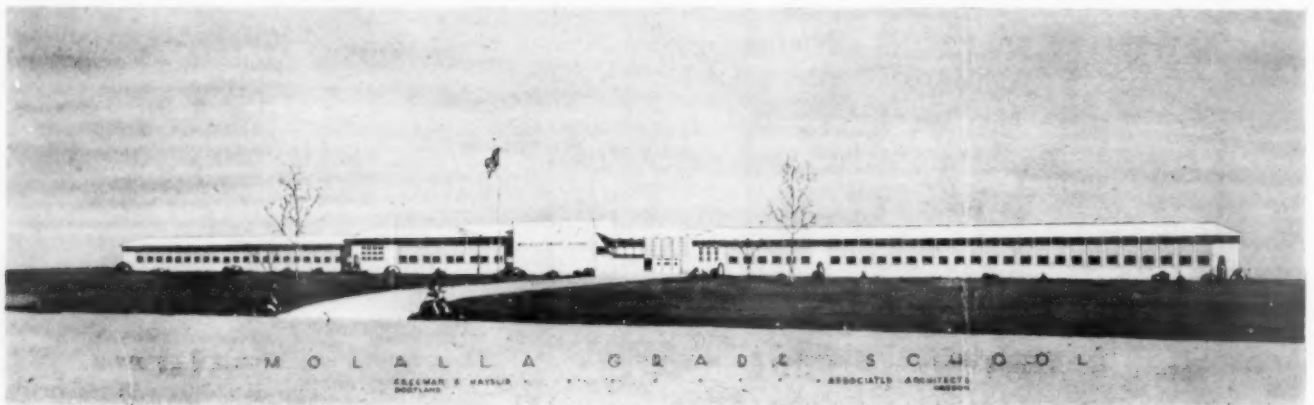
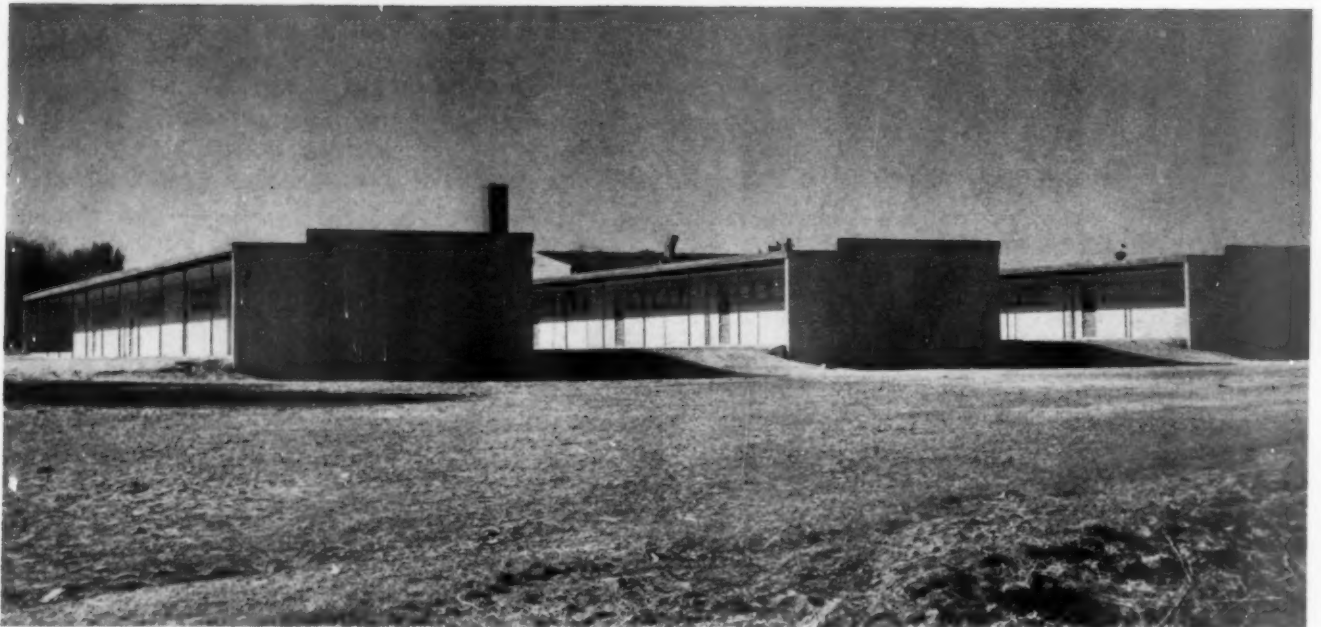
Woodward Junior High School, Woodward, Oklahoma. Joe Davis, Architect.



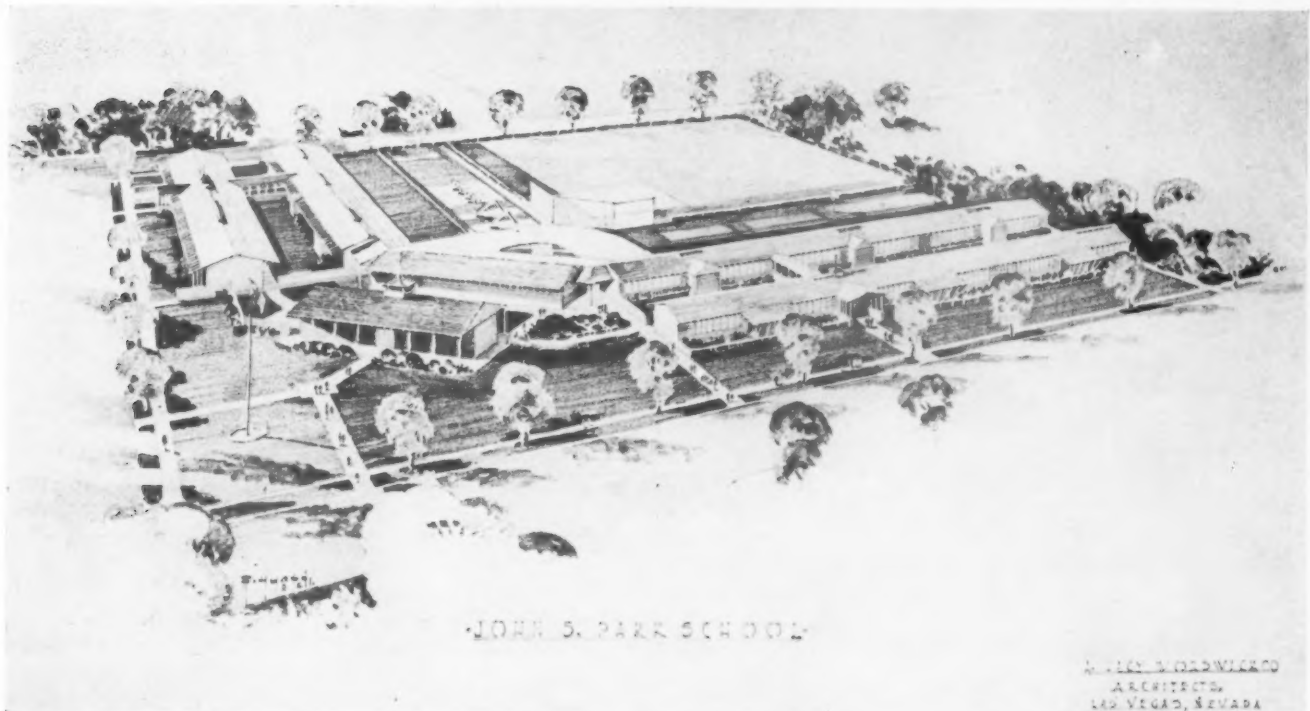
Age Group	Percentage
0-10	10
11-20	15
21-30	35
31-40	25
41-50	15
51-60	10
61-70	5
71-80	2
81-90	1
91-100	0



Left, the entrance to the Lindbergh Elementary School, Ontario, Oregon. Below, a side view of Lindbergh School. Lee Cooke, Architect.



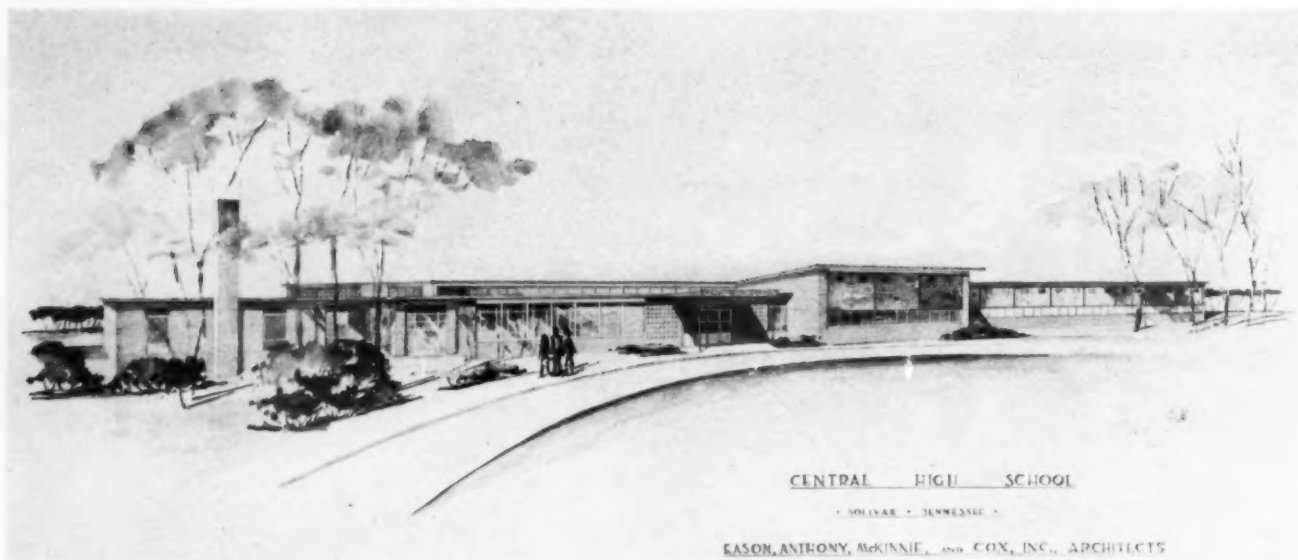
The proposed plan for the Molalla Grade School, Molalla, Oregon. Freeman, Hayslip, Architects.



The proposed plans for the John S. Park School, above, and Westside Grade School, Las Vegas, Nevada. A. Lacy Worswick Company, Architects.







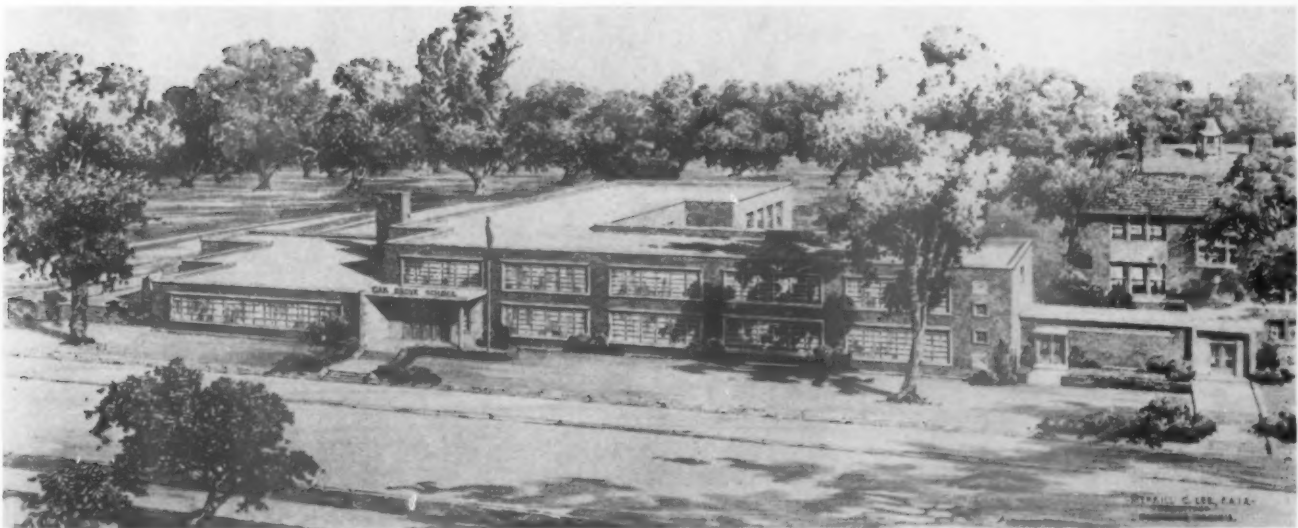
The proposed plan for Central High School, Bolivar, Tennessee.



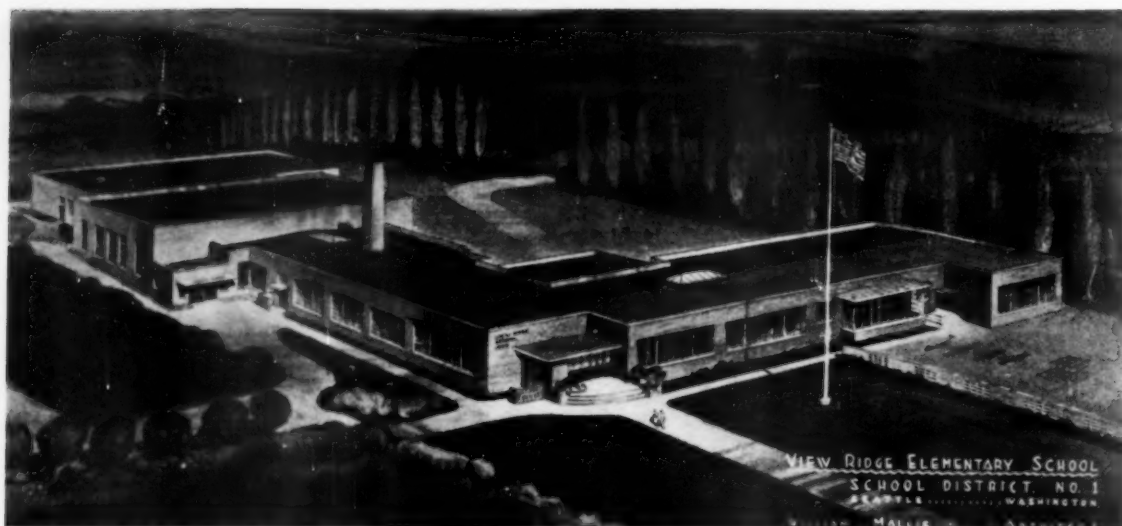
The Canyon Lake Elementary School, Rapid City, South Dakota, was completed in September, 1949. It was built for approximately \$245,000. Ewing and Forrette, Architects.



David G. Jacox School, Norfolk, Virginia. Vernon A. Moore, Architect.



The proposed plan for the Oak Grove Elementary School addition, Richmond, Virginia. Merrill C. Lee, Architect.



The proposed plan for the View Ridge Elementary School, Seattle, Washington. William Mallis, Architect.

The features of these buildings were not secured through wishful thinking on the part of the educational staff and people of the community. They are outstanding as a result of study and planning on the part of the whole community.

The people who live in the communities where these schools are located probably would be the first to point

out the shortcomings of their buildings. Although these buildings are not perfect, they are examples of the great strides made in planning and designing new schools. The features found in these schools may be planned for other new schools. The needs of children and adults can be met through wise planning on the part of all concerned with the building process.



## LIST OF OUTSTANDING SCHOOL BUILDINGS

CONSTRUCTED SINCE JANUARY 1, 1946

(As recommended by State Departments of Education)

<i>Location</i>	<i>Name of School</i>	<i>Type of School</i>	<i>Name of Superintendent</i>
Alabama			
Birmingham	Shades Valley School	Sec.	I. F. Simmons
Cullman	Cullman High School (addition)	Sec.	L. W. Yates
Cullman	West End School	Elem.	L. W. Yates
Eufaula	Eufaula Elem. School	Elem.	O. B. Carter
Gadsden	Bellevue School	Elem.	C. A. Donehoo
Gorgas	Gorgas School	Elem.	Amos I. Waldrop
Jacksonville	Jacksonville High School	Sec.	Ernest Stone
La Fayette	Chambers Cy. Training School	Sec.	Morse Haynes
Millbrook	Sandtown School	Elem.	J. R. Formby
Montgomery	Geo. Washington Carver School	Sec.	C. M. Dannelly
Montgomery	Booker T. Washington School	Sec.	C. M. Dannelly
Opelika	West End School	Elem.	T. H. Kirby
Piedmont	Frances E. Willard School	Elem.	W. H. Kimbrough
Selma	R. B. Hudson High School	Sec.	W. E. Snuggs
Troy	Troy Negro School		Roy E. Feffcoat
Arizona			
Douglas	Douglas Senior High School	Sec.	Hollice E. Stevenson
Flagstaff	Flagstaff High School	Sec.	Sturgeon Coomer
Morenci	Morenci High School	Sec.	Joseph H. Fairbanks
Phoenix	Montevista Elem. School	Elem.	W. T. Machan
Phoenix		Elem.	J. B. Sutton
Phoenix	Madison Elem. School	Elem.	C. L. Harkins
Phoenix		Elem.	Donald E. Tope
Phoenix	Encanto School	Elem.	J. J. Clark
Phoenix	West Phoenix High School	Sec.	D. F. Stone
Prescott		Elem.	Don R. Sheldon
Scottsdale	Scottsdale High School	Sec.	W. W. Dick
Tucson		Elem.	Robert D. Morrow
Tucson	Tucson Senior High School	Sec.	Robert W. Morrow
Arkansas			
Crossett	Crossett High School	Sec.	Silas Snow
El Dorado	El Dorado Negro High School	Sec.	G. A. Stubblefield
Fort Smith		Elem.	J. W. Ramsey
Helena	Central High School	Sec.	J. F. Wahl
Hope		Elem.	James H. Jones
Little Rock	Benj. Franklin Grade School	Elem.	Harry Little
Little Rock	Geo. W. Carver Grade School	Elem.	Harry Little
Marion		Elem.	L. P. Mann
Pine Bluff		Elem.	H. F. Dial
California			
Carmel	Dolores Street School	Elem.	Stuart Mitchell
Culver City	Farragut Drive School	Elem.	Jack R. Singer
Dos Palos	Dos Palos Elem. School	Elem.	Mrs. Blanche Schmidt
El Monte	Rosemead High School	Sec.	Robert S. Hicks
Hayward	Cherryland School	Elem.	Jack Rees
Indio	Shadow Mountain School	Elem.	Rex Johnson
La Mesa	Casa de Oro School	Elem.	Glenn E. Murdock
Lawndale	Lawndale School	Comb.	Mrs. Pearl M. Kennedy
Martinez	Montecito School	Elem.	Forrest V. Routt
Mountain View	Escuela School	Elem.	Kenneth N. Slater
Sacramento	Pacific Elementary School	Elem.	Mrs. Fern Bacon
Colorado			
Adams City	Adams City Elem. School	Elem.	W. B. Fitzsimmons
Colorado Springs	Palmer School	Elem.	Roy J. Wasson
Craig	Moffat Cy. Senior High School	Sec.	John A. Gilchrist
Grand Junction	Tope Elementary School	Elem.	I. K. Boltz
Ignacio	Ignacio High School	Sec.	C. A. Way
Las Animas	Memorial School	Elem.	Elmer Burkhard
Pueblo	Park View School	Elem.	Ernest Hanson

LIST OF OUTSTANDING SCHOOL BUILDINGS—*Continued*

<i>Location</i>	<i>Name of School</i>	<i>Type of School</i>	<i>Name of Superintendent</i>
Connecticut			
Burlington	Burlington Consolidated School	Elem.	F. J. Penley
New Canaan	New Canaan Elem. School	Elem.	Albert P. Mathers
North Haven	Ridge Road Elem. School	Elem.	Maurice S. Hammond
South Coventry	Consolidated Elem. School	Elem.	J. C. Reilly
West Hartford	Webster Hills School	Elem.	Edmund Thorne
Yalesville	Yalesville Elem. School	Elem.	William H. Curtis
Delaware			
Edgemoor	Edge Moor Road School	Elem.	John F. Heiney
Wilmington	Silverside School	Elem.	John F. Heiney
Florida			
Baldwin	Baldwin High School	Sec.	W. Daniel Boyd
Gainesville	Lincoln School Additions	Elem.	Howard W. Bishop
Gainesville	Sidney Lanlew School Additions	Elem.	Howard W. Bishop
Hollywood	South Broward High School	Sec.	Ulric J. Bennett
Jacksonville	College Park Negro School	Elem.	W. Daniel Boyd
Orlando	Fern Creek Elem. School	Elem.	Judson B. Walker
Palm Beach County	Delray-Boynton School	Elem.	Howell L. Watkins
Tallahassee	Kate Sullivan School	Elem.	A. P. Godby
Tallahassee	South City Elem. School	Elem.	A. P. Godby
Tampa	Dale Mabry School	Elem.	Crockett Farnell
Georgia			
Atlanta	E. Rivers School	Elem.	Paul D. West
Columbus	Johnson Elem. School	Elem.	Wm. H. Shaw
Covington	Newton Cy. High School	Sec.	E. L. Ficquet
LaFayette	Lafayette North Elem. School	Elem.	F. D. Leake
Macon	Ballard-Hudson Sr. High School	Sec.	Mark Smith
Pavo	Pavo Elem. & High School	Comb.	W. H. Rehbergh
Sylvania	Screven County High School	Sec.	J. K. Boddiford
Waycross	Bailey Street School	Elem.	J. D. Salter
Waycross	Hazzard Hill School	Elem.	J. D. Salter
Idaho			
Boise	South Junior High School	Sec.	Zed L. Foy
Boise	Whittier School	Elem.	Zed L. Foy
Bonnors Ferry	Mount Hall Elem. School	Elem.	R. N. Soderling
Bonnors Ferry	South Hill School	Elem.	R. N. Soderling
Gooding	Gooding Elem. School	Elem.	Leigh Ingersoll
Jerome	Jerome High School	Sec.	W. V. Olds
Lewiston	Webster Elem. School	Elem.	Ben Herron
Lewiston	Westside Elem. School	Elem.	Ben Herron
Nampa	Lincoln Grade School	Elem.	Fulton Gale
Payette	Westside Elem. School	Elem.	William Sorenson
Illinois			
Cambridge	Cambridge High School	Sec.	Noel Mosher
Creve Coeur	Creve Coeur Elem. School	Elem.	Vernon B. Litchfield
Decatur	Lakeview High School	Sec.	H. B. Green
Homewood	Homewood Elem. School	Elem.	Everett F. Kerr
Neoga	Neoga Elem. School	Elem.	Wayne Hance
Pekin	Wilson Elem. School	Elem.	C. B. Smith
Rock Island	Alleman High School	Sec.	Rev. John O'Connor
Indiana			
Akron	Akron Grade School	Elem.	S. Earl Rouch
Connersville	Connersville Grade School	Elem.	Floyd A. Hines
Evansville	East Side School		Ralph Becker
Goshen			R. B. Weaver
Grandview			C. J. Engelbrecht
Liberty	Liberty Elem. School	Elem.	Charles S. Wischard
Marion	Clayton Brownlee School	Elem.	Orville J. Hooker
Perry Township	James Whitecomb Riley School	Elem.	R. F. Gladden
South Bend			Frank E. Allen

## LIST OF OUTSTANDING SCHOOL BUILDINGS—Continued

<i>Location</i>	<i>Name of School</i>	<i>Type of School</i>	<i>Name of Superintendent</i>
<b>Iowa</b>			
Des Moines	Benj. Franklin Jr. High School	Sec.	N. D. McCombs
Des Moines	Meredith School	Elem.	N. D. McCombs
Des Moines	Windsor School	Elem.	N. D. McCombs
Martelle	Martelle Consolidated School	Elem.	E. J. Shelton
Newton	Newton High School	Sec.	Ben Berg
Ottumwa	Wildwood Elementary School	Elem.	Frank W. Douma
<b>Kansas</b>			
Elkhart		Elem.	Raymond Harrison
Garden City	Alta Brown School	Elem.	J. R. Jones
Olathe	State School for Deaf Addition	Elem.	Stanley D. Rogh (Prin.)
Sedan	Sedan Double Unit Grade School	Elem.	Edwin Lowe
Wichita	W. H. Isley Elem. School	Elem.	Wade Fowler
Winfield	District R-9 School	Elem.	Helen Sherrard
<b>Kentucky</b>			
Harrison County	Harrison Cy. High School	Sec.	W. L. Case
Louisville	MacArthur Elem. School	Elem.	Omer Carmichael
Mt. Washington	Mt. Washington School	Elem.	W. O. Anderson
Muhlenberg County	Powderly Elem. School	Elem.	Robert H. Shaver
Richardsville	Richardsville School	Comb.	C. T. Clemons
Tompkinsville	Tompkinsville Cy. High School	Sec.	E. P. Harlan
<b>Louisiana</b>			
Baton Rouge	Goodwood Elem. School	Elem.	C. L. Barrow
Denham Springs	Denham Springs High School	Sec.	Watson Bankston
Homer	Homer Elem. School	Elem.	F. C. Haley
Jena	Jena High School	Sec.	F. H. Shiel
Minden	East & West Side Elem. School	Elem.	J. E. Pitcher
New Iberia	Dodson Elem. School	Elem.	L. G. Porter
New Iberia	Hopkins Street Elem. School	Elem.	L. G. Porter
New Iberia	New Iberia Elem. School	Elem.	L. G. Porter
Shreveport	Shreveport Negro High School	Sec.	R. H. White
Sulphur	Sulphur Junior High School	Sec.	H. A. Norton
Transylvania	Transylvania High School	Sec.	M. M. Walsworth
<b>Maine</b>			
Ashland	Ashland Regional High School	Sec.	Buford Grant
Caribou	Caribou Elem. School	Elem.	Hayden Anderson
East Wilton	Wilton Elem. School	Elem.	Neil Sullivan
Houlton	Houlton High School	Sec.	George Cumming
Presque Isle	Presque Isle High School	Sec.	Roland B. Andrews
<b>Maryland</b>			
Annapolis	Bates High School Additions	Sec.	David S. Jenkins
Bel Air	Bel-Air Junior-Senior High	Sec.	C. W. Willis
Dundalk	Sollers Point High School	Sec.	Edward G. Stapleton
Landover Hills	Langley Park Elem. School	Elem.	G. Gardner Shugart
Salisbury	Prince Street Elem. School	Elem.	James M. Bennett
Silver Spring	Oak View School	Elem.	Edwin W. Broome
Towson	Towson High School	Sec.	Edward G. Stapleton
<b>Massachusetts</b>			
Braintree	Braintree High School Addition	Sec.	Ralph W. Proctor
Brookline	North Wing Brookline H. S.	Sec.	Ernest R. Caverly
Canton	Canton High School	Sec.	John A. Whitehead
Deerfield	Deerfield High School	Sec.	Sidney Osborne
Framingham	High School	Sec.	Richard N. Anketell
Hingham	New South Elem. School	Elem.	Anson B. Barber
Lexington	Fiske Elem. School	Elem.	Thomas S. Grindle
Melrose		Elem.	Natt B. Burbank
Natick	Lincoln School	Elem.	E. Davis Woodbury
Newton	Newton Trade School	Sec.	Harold B. Gores
Reading	Joshua Eaton School	Elem.	Arthur B. Lord, Jr.
Stow	Hale High School	Sec.	Blynn E. Davis
Waltham	Warrendale School	Elem.	John W. McDevitt
Wayland	Cochituate School	Elem.	Owen B. Kiernan
Wayland	Sudbury School	Elem.	Owen B. Kiernan
Wayland	Wayland High School	Sec.	Owen B. Kiernan
Weston	Weston High School	Sec.	Thomas E. Rush



## LIST OF OUTSTANDING SCHOOL BUILDINGS—Continued

<i>Location</i>	<i>Name of School</i>	<i>Type of School</i>	<i>Name of Superintendent</i>
Michigan			
Allen Park	Arno Elementary School	Elem.	Wm. C. Harris
Battle Creek	Coburn School	Elem.	Virgil Rogers
Comstock		Elem.	L. F. Greene
Dearborn	Haigh Elem. School Addition	Elem.	James A. Lewis
East Lansing	Red Cedar School	Elem.	M. F. Egdorf
Flint	Bendle West School	Elem.	T. N. Lamb
Kalamazoo	South Side Junior High School	Sec.	Loy Norrix
Lansing	Mt. Hope School	Elem.	Dwight H. Rich
Menominee County	Cedar River School	Elem.	Mrs. Ethel Schuyler
Van Dyke	Fitzgerald Jr. High School	Sec.	Mrs. Z. Neigebaur Sperry
Walled Lake	Glengarry Neighborhood School	Elem.	Clifford H. Smart
Minnesota			
Anoka	Lincoln Elem. School	Elem.	Morris Bye
Bloomington	East Side Elem. School	Elem.	Hubert G. Olson
Crystal Bay	Hill Elementary School	Elem.	Emery H. White
Edina	Edina Jr. Sr. High School	Sec.	Elwyn L. Miller
Hopkins	Katherine Curren School	Elem.	L. H. Tanglen
Mankata	High School	Sec.	J. E. Anderson
Richfield	Central Elem. School	Elem.	Harry E. Rumpel
Robbinsdale	Lee Avenue School	Elem.	Edwin J. Cooper
Rochester	Horace Mann Elem. School	Elem.	N. Durward Cory
St. Cloud	Lincoln Elem. School	Elem.	H. B. Gough
St. Cloud	Washington Elem. School	Elem.	H. B. Gough
St. Louis Park	Brookside Elem. School	Elem.	Harold R. Enestvedt
St. Louis Park	Fern Hill Elem. School	Elem.	Harold R. Enestvedt
St. Louis Park	Lennox Elem. School	Elem.	Harold R. Enestvedt
Mississippi			
Benton	Benton Elem. School	Elem.	E. B. Golding
Clarksdale	Clarksdale Negro School	Elem.	H. B. Heidelberg
Greenville	Greenville Elem. School	Elem.	R. J. Koonce
Hattiesburg	West End Elem. School	Elem.	S. H. Blair
Laurel	Nora Davis Elem. School	Elem.	J. M. Caughman
Natchez	Wm. H. Braden Elem. School	Elem.	W. H. Braden
Picayune	Picayune High School	Sec.	J. E. Bond
Prentiss	Prentiss High School	Sec.	W. K. McKay
Vicksburg	Groves Street School	Elem.	H. V. Cooper
Winona	Winona High School	Sec.	Robert Taylor
Missouri			
Afton	Reavis School	Elem.	Charles J. Mesnier
Caruthersville	Caruthersville School	Elem.	R. M. Pierce
Farmington		Elem.	C. R. Bell
Ladue	Conway School	Elem.	Ivan C. Nicholas
Normandy	Normandy Junior High School	Sec.	Ward E. Barnes
North Kansas City	Norclay Elem. School	Elem.	Herbert W. Schooling
Overland	Ritenour School	Elem.	Arthur A. Hoech
Raytown	Blue Ridge School	Elem.	Joe Herndon
Springfield	Harry P. Study School	Elem.	H. P. Study
University City	Blackberry Lane School	Elem.	Julius E. Warren
Montana			
Belt	Belt Valley High School	Sec.	O. C. Short
Billings	Washington School	Elem.	M. C. Gallagher
Browning			Douglas Gold
Butte	Webster-Garfield School	Elem.	Harry Ross
Great Falls	In Process no name yet	Elem.	R. B. Farnsworth
Helena	New Jefferson School	Elem.	E. W. Fellbaum
Kalispell	Mech. Arts and Voc. Agri. bldg.	Sec.	K. A. Rawson
Livingston			K. W. Haines
Missoula			D. S. Porter
Richey			Donald Blair
Nebraska			
Alliance	Emerson Elem. School	Elem.	H. R. Partridge
Boys Town	High School	Sec.	H. L. Crawford
De Witt	De Witt Single Unit	Comb.	Perry T. Johns
Scottsbluff	High School Addition	Sec.	Charles H. Davis, Jr.
Scottsbluff	Stadium and Voc. Agri. Bldg.	Sec.	Charles H. Davis, Jr.

## LIST OF OUTSTANDING SCHOOL BUILDINGS—Continued

<i>Location</i>	<i>Name of School</i>	<i>Type of School</i>	<i>Name of Superintendent</i>
<b>Nevada</b>			
Boulder City	Boulder City High School	Sec.	Elbert Edwards
Fallon	West End Elem. School	Elem.	Albert Seeliger
Las Vegas	High School	Sec.	Walter Johnson
Las Vegas		Elem.	Walter Johnson
Las Vegas		Elem.	Walter Johnson
Panaca	Panaca Elem. School	Elem.	Mrs. Amy D. Mathews
Paradise	Paradise School	Elem.	Dayton Benjamin
Reno	Veterans Memorial School	Elem.	Earl Wooster
<b>New Hampshire</b>			
Hinsdale	Hinsdale Elem. School	Elem.	Chester C. Lees
Lancaster	Lancaster Elem. School	Elem.	C. Newton Heath
Meredith	Moultonboro Elem. School	Elem.	Almon W. Bushnell
Salem	Salem Elem. School	Elem.	L. Munro Grandy
Walpole	Walpole High School	Sec.	Theron B. Thompson
<b>New Jersey</b>			
East Brunswick Twp.	Memorial Elem. School	Elem.	Murray A. Chittick
Hightstown	Hightstown Elem. School	Elem.	J. Harvey Shue
Kearny	Washington High School	Sec.	Edmund Tink
Lakewood	Ella G. Clarke School	Elem.	Oliver B. Lane
Livingston	Livingston Jr. High	Sec.	Frank B. Stover
Palmyra	Charles Street School	Elem.	John B. Geissinger
River Edge	River Edge Elem. School	Elem.	H. M. Davis
Tenafly	Walter Stillman School	Elem.	Howard Henderson
Union	Union High School Addition	Sec.	Charles T. Hassard
Wall Twp.	Central School	Elem.	Richard H. Woolson
<b>New Mexico</b>			
Alamogordo	Alamogordo Grade School	Elem.	Barnie Caton
Albuquerque	Highlands High School	Sec.	John Milne
Clovis	James Bickley Grade School	Elem.	R. E. Marshall
Eunice	Eunice Grade School	Elem.	C. H. Conway
Hobbs	Hobbs High School	Sec.	Charles Mills
Las Vegas	Las Vegas High School	Sec.	W. J. Robertson
Lovington	Lovington Grade School	Elem.	H. C. Pannell
<b>New York</b>			
Buffalo	Cleveland Hill High School	Sec.	Andrew C. Beam
Delmar	Clarksville School	Elem.	Hamilton H. Bookhout
Ithaca	West Hill School	Elem.	Claude L. Kulp
Kenmore	Philip Sheridan School	Elem.	Frank C. Densberger
Mineola	Waltoffer Avenue School	Elem.	Harry W. Gross
Orchard Park	Orchard Park High School	Sec.	Elmer E. Handel
Patchogue	Lake Ronkonkoma School	Elem.	Walter M. Ormsby
Rotterdam Junction	Craig School	Elem.	John H. Fink
<b>North Carolina</b>			
Albemarle	Albemarle Elem. School	Elem.	Claud Grigg
Asheboro	Asheboro High School	Sec.	Guy B. Teachey
Charlotte	Chantilly Elem. School	Elem.	E. H. Garringer
Concord	Royal Oaks School	Elem.	C. S. Furr
Concord	Shankletown Elem. School	Elem.	C. S. Furr
Fayetteville	Long Hill School	Elem.	F. D. Byrd, Jr.
Gastonia	Gaston Elem. School	Elem.	M. A. Waters
Greensboro	Sternberger School	Elem.	B. L. Smith
Kinston	La Grange School	Elem.	H. H. Bullock
Southern Pines	Southern Pines Elem. School	Elem.	P. J. Weaver
Statesville	Statesville Addition	Sec.	M. T. Lambeth
Winston-Salem	Lewisville School		Ralph F. W. Brimley
Winston-Salem	Mineral Springs School		Ralph F. W. Brimley
<b>North Dakota</b>			
Bismarck	Richholt Grade School	Elem.	A. C. Van Wyk
Dickinson	Dickinson Grade School	Elem.	A. L. Hagen
Fargo	Fargo Junior High School	Sec.	H. H. Kirk
Grand Forks	Winship Grade School	Elem.	E. H. Schroeder
Minot	Longfellow School	Elem.	Paul Miller
Mountain	Mountain Public School		Ambrose A. Mahar

## THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

## LIST OF OUTSTANDING SCHOOL BUILDINGS—Continued

<i>Location</i>	<i>Name of School</i>	<i>Type of School</i>	<i>Name of Superintendent</i>
<b>Ohio</b>			
Aurora	Aurora Elem. School	Elem.	C. P. Rausch
Berea	Race Street School	Elem.	John F. Koeppe
Dayton	Van Buren Junior High School	Sec.	W. A. Driscoll
Euclid	Euclid High School	Sec.	Russell H. Erwine
Findlay	Northview, Jefferson School	Elem.	F. L. Kinley
Franklin	Anthony Wayne School	Elem.	R. E. Augsburg
Greenville	East Elem. School	Elem.	C. L. Bailey
Massillon	Jackson High School	Sec.	T. C. Knapp
Oakwood	Harrison School Addition	Elem.	Delbert Woodford
Painesville	Riverside Jr. High School	Sec.	John R. Williams
Piqua	Favorite Hill School	Elem.	C. M. Sims
Sandusky		Elem.	Karl E. Whinnery
Wadsworth	Wadsworth Centralized Jr. High	Sec.	Harold A. White
Wapakoneta	Centennial School	Elem.	Irvin L. Conrad
West Carrollton	West Carrollton Elem. School	Elem.	W. E. Shade
Westlake	Westlake Elem. School	Elem.	L. G. Burneson
<b>Oklahoma</b>			
Beaver	Beaver Grade School	Elem.	M. L. Korn
Boise City	Boise City High School	Sec.	E. W. Alexander
Frederick	Frederick High School	Sec.	Bryan Waid
Seminole	High School	Sec.	O. D. Johns
Woodward	High School	Sec.	Wilson Riley
<b>Oregon</b>			
Cave Junction	Illinois Valley High School	Sec.	Laurance C. Moffitt
Eugene	Williamette High School	Sec.	Tom Powers
Grants Pass	Grants Pass High School	Sec.	M. B. Winslow
Gresham	Gresham Upper Grade School	Sec.	Gordon Russell
Klamath Falls	Peterson School	Elem.	Carrol B. Howe
Molalla	Molalla Grade School	Elem.	Nell B. Adams
Ontario	Lindbergh School	Elem.	Arthur Kiesz
Parkrose	Parkrose Primary School	Elem.	Don J. Campbell
St. Helens	McBride School	Elem.	Floyd Light
Salem	Washington School	Elem.	Frank Bennett
<b>Pennsylvania</b>			
Abington	Addition to Elem. School	Elem.	Raymond H. White
Allentown	Lehigh Parkway School	Elem.	Charles F. Seidel
Allentown	Midway Manor School	Elem.	Charles F. Seidel
Bethel Twp.	Bethel Memorial School	Elem.	T. M. Buck
Forest Hills	Junior High School	Sec.	D. P. Jones
Hickory Twp.		Elem.	Kenneth R. Delahunty
Lemoyne	Washington Heights School	Elem.	K. W. Etshied
Lower Burrell Twp.		Elem.	M. Vincent Wills
Penn Twp.	Junior High School	Sec.	John H. Linton
Punxsutawney		Elem.	James T. Downie
York City	General Devers School	Elem.	Arthur W. Ferguson
<b>South Carolina</b>			
Charleston	Rhett School	Elem.	George C. Rogers
Clover	Clover High School	Sec.	T. G. Kinard
Georgetown	Howard High School	Sec.	H. A. White
Hartsville	Butler School	Elem.	J. C. Holler
Hartsville	Hartsville Elem. School	Elem.	J. C. Holler
Orangeburg	Orangeburg High School	Sec.	E. W. Rushton
Reidville	Reidville High School	Sec.	N. H. Henderson
Saluda	Saluda High School	Sec.	J. C. Hatchett
Sumter	Sumter Elem. School	Elem.	E. R. Crow
Tucapau	Startex School		D. A. Snow
<b>South Dakota</b>			
Belle Fourche	Jefferson School	Elem.	Frank M. Kover
Beresford	Beresford Elem. School	Elem.	M. H. Shennum
Britton	Britton Grade School	Elem.	W. E. Cermak
Milbank			H. E. Marquette
Missoin	Todd County High School	Sec.	H. D. Redfern
Pierre			M. L. Reynolds

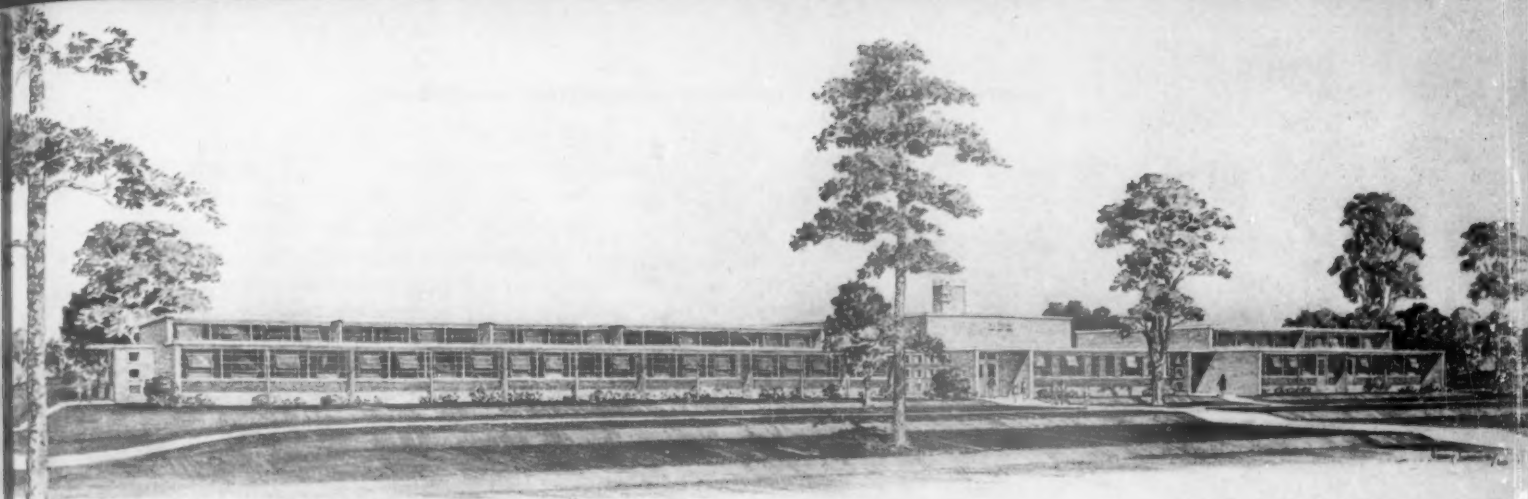


## LIST OF OUTSTANDING SCHOOL BUILDINGS—Continued

<i>Location</i>	<i>Name of School</i>	<i>Type of School</i>	<i>Name of Superintendent</i>
<i>South Dakota—Continued</i>			
Rapid City	Canyon Lake School	Elem.	E. B. Bergquist
Sioux Falls	Jefferson School	Elem.	Lyman Fort
Summit			M. L. Witcher
Watertown	Roosevelt Elem. School	Elem.	Dwight D. Miller
<i>Tennessee</i>			
Bolivar	Central High School	Sec.	Quinnie Armour
Dickson	Dickson Elem. School	Elem.	W. H. Garrett
Greenville	Greene County High School	Sec.	Glennon C. Brown
Henderson	Chester County High School	Sec.	Thomas B. Armour
Jasper	Jasper Elem. School	Elem.	James T. Progmore
Memphis	East High School	Sec.	Ernest C. Ball
Oak Ridge	Oak Ridge High School	Sec.	R. H. Ostrander
Paris	Grove High School	Sec.	Joe Morgan
Winchester	Franklin County High School	Sec.	James A. Clark
<i>Texas</i>			
Austin	Govalle School	Elem.	J. W. Edgar
Baytown	Goose Creek School		George Gentry
Beaumont	Ogden School	Elem.	R. L. Williams
Needville			James L. Boone
Pampa			Knox Kinard
Port Neches	Groves Junior High School	Sec.	C. L. Yarbrough
Rosenberg			F. C. Herndon
San Angelo	Robert E. Lee Jr. High	Sec.	Bryan Dickson
San Antonio	Alamo Heights Senior High	Sec.	E. T. Robbins
Seguin			Joe F. Saegert
<i>Utah</i>			
American Fork	Forbes Elem. School	Elem.	D. R. Mitchell
Brigham City	Central Elem. School	Elem.	Kenneth E. Weight
Cedar City	Cedar City East Side Elem.	Elem.	Ianthus Wright
Ogden	Weber Junior High School	Sec.	A. Parley Bates
Orem	Geneva Elem. School	Elem.	D. R. Mitchell
Provo	Grandview Elem. School	Elem.	J. C. Moffitt
Salt Lake City	Dilworth School	Elem.	M. Lynn Bennion
Salt Lake City	Libby Edward School	Elem.	David Gourley
Salt Lake City	Valley Junior High School	Sec.	David Gourley
<i>Vermont</i>			
Burlington	Thayer Grade School	Elem.	Lyman C. Hunt
Canaan	Canaan Grade School	Elem.	Roland Currier
Charlotte	Charlotte Consolidated School	Comb.	Lloyd W. Moulton
Eden	Eden Consolidated School	Elem.	Robert Lorette
Enosburg Falls	Enosburg High School Addition	Sec.	Tobin Haggerty
Manchester Center	Manchester Grade School	Elem.	Edwin Bigelow
Shelburne	South Burlington Addition	Elem.	Robert D. Lull
Springfield	Elm Street Grade School	Elem.	Lyman W. Bole
Vergennes	Vergennes Grade School	Elem.	Lloyd W. Moulton
<i>Virginia</i>			
Arlington County	Greenbrier School	Elem.	W. A. Early
Arlington County	Glencarlyn School	Elem.	W. A. Early
Frederick County	James Wood High School	Sec.	L. D. Kline
Giles County	Narrows Elem. School	Elem.	R. K. Johnson
Henrico County	Glen Lea Elem. School	Elem.	C. K. Holsinger
Martinsville	Patrick Henry Grammar School	Elem.	M. L. Carper
Newport News	George Wythe Jr. High School	Sec.	R. O. Nelson
Norfolk	David G. Jacox School	Elem.	E. S. Brinkley
Richmond	Oak Grove School Addition	Elem.	H. I. Willett
Roanoke	Munroe Jr. High School	Sec.	D. E. McQuilkin
<i>Washington</i>			
Bremerton	Manette School	Elem.	Stanley S. Wynstra
Kelso	Catlin School	Elem.	E. E. Hariss
Kirkland	Lake Washington Sr. High	Sec.	Morton A. Johnson
Longview	Olympic School	Elem.	E. J. McNamara
Olympia	Roosevelt School	Elem.	Leland P. Brown

## LIST OF OUTSTANDING SCHOOL BUILDINGS—Continued

<i>Location</i>	<i>Name of School</i>	<i>Type of School</i>	<i>Name of Superintendent</i>
Pullman	New Edison School	Elem.	Louis V. Bruno
Seattle	View Ridge School	Elem.	Samuel E. Fleming
Seattle	Puget Sound Jr. High School	Sec.	L. D. Baker
Seattle	Jane Addams Jr. High School	Sec.	Ray W. Howard
Spokane	Madison School	Elem.	John A. Shaw
Sunnyside	Washington School	Elem.	Albert L. Ayars
Tacoma	Mont Downing School	Elem.	Howard R. Goid
Tieton	Highland High School	Sec.	Clarence Zimmerman
West Virginia			
Bluefield	Park Central Colored School	Sec.	C. H. Archer
English	English Elem. School	Elem.	G. W. Bryson
Fairmont	Kingmont Elem. School	Elem.	J. J. Straight
Huntington	Meadows Elem. School	Elem.	Olin C. Nutter
Inwood	Musselman High School	Sec.	James L. Creasy
Spencer	Spencer Elem. School	Elem.	R. Myles Spencer
Terra Alta	Terra Alta Elem. School	Elem.	Paul W. Watson
Wisconsin			
Beloit	Beloit Memorial High School	Sec.	Victor F. Dawald
Biron			S. G. Corey
Maple	Northwestern High School	Sec.	Edith Turnell
Neenah	Wilson Elem. School	Elem.	Harold Mennes
Winneconne	Winneconne Community School	Comb.	Eva C. Monson
Wyoming			
Cheyenne	Deming Grade School	Elem.	J. L. Goins
Cody	West Elementary School	Elem.	Frank G. Kraus
Medicine Bow	Medicine Bow High School	Sec.	Forrest M. Johnson, Jr.
Powell		Elem.	C. W. Richard
Rawlins		Elem.	Robert E. Lee
Rock Springs	Lincoln Grade School	Elem.	E. M. Thompson
Torrington	Lincoln Elem. School	Elem.	E. E. Engleman
Worland	Junior High School	Sec.	Frank Watson



• WESTOVER • TERRACE • ELEMENTARY • SCHOOL •  
• GREENSBORO • N. C. •

• Mc MINN • & • NORFLEET • ARCHITECTS •  
• GREENSBORO • N. C. •

## ADEQUATE SCHOOL BUILDINGS IN NORTH CAROLINA

By **W. F. CREDLE**

Director of Schoolhouse Planning, North Carolina State Department of Public Instruction

**EDWARD W. WAUGH**

Architectural Design Consultant, North Carolina Division of Schoolhouse Planning

**RICHARD P. LEAMAN and ALBERT B. CAMERON**

Senior Students of Architecture, North Carolina State College School of Design and  
Architectural Assistants in the Division of Schoolhouse Planning

**T**HE SCHOOL BUILDING problem in North Carolina is not a new one. It was inculcated in the first statewide public school law offered before the Legislature. At that time, it was not deemed feasible to attempt operation and construction on a statewide basis. Since operation was the natural first step, the state partially accepted this obligation in 1839.

In the past 100 years, much has been done to ad-

vance and improve the role of the state in this field. Now the state bears virtually the entire expense for operating the public school system.

Outright grants-in-aid to school buildings were not enacted into law until 1949. Educational leaders in the state, however, thought about the state's responsibility in school building for over a century. Here are some borderline approaches:

In 1903 remnants of the old State Literary Fund,



W. F. CREDLE



E. W. WAUGH



A. B. CAMERON



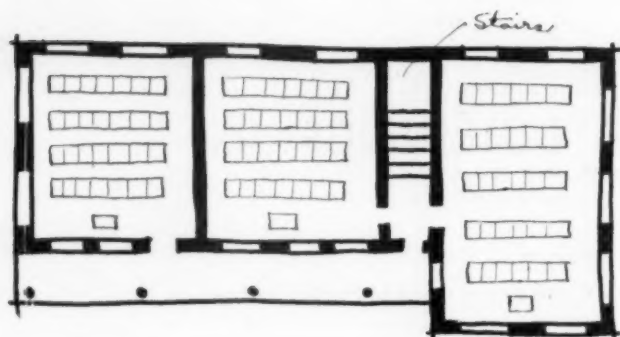
R. P. LEAMAN

Mr. Credle, director of schoolhouse planning in the North Carolina State Department of Public Instruction since 1932, is a graduate of the University of North Carolina. He holds a master's degree from George Peabody College for Teachers, has been a teacher, county superintendent, soldier, and banker. He is a member of the National Council on Schoolhouse Construction and was its president in 1938. Mr. Waugh, architectural design consultant in North Carolina's Division of Schoolhouse Planning, is a graduate of Edinburgh College of Art and Heriot Watt College of Engineering, Edinburgh. He is a member of the American Institute of Architects, Royal Institute of British Architects, National Council on Schoolhouse Construction. He has won several awards for designing houses and schools. Mr. Leaman is an ex-United States Air Force bomber pilot and a junior member of the A.I.A. Mr. Cameron was a bomber navigator in the Air Force, has won an award for designing a private seaplane base, and is also a junior member of the A.I.A. Both these men are senior students of architecture at the North Carolina State College School of Design and architectural assistants in the Division of Schoolhouse Planning. They assisted Mr. Waugh in replanning the campus of North Carolina State College and the Woman's College of the University of North Carolina in 1949.





FORERUNNER OF THE PUBLIC SCHOOL



PLAN.

no longer important in operating schools, were converted into a loan fund for school buildings. Loans were made only for construction of school buildings, if plans had been approved by the state superintendent of public instruction. This statutory provision was broadened to include plans for all buildings, regardless of how they were financed. This was the beginning of schoolhouse planning at the state level, and it has continued to the present time. In connection with these procedures the state took steps toward a better reorganization of schools. Priority was given to applications for loans that contemplated consolidating or combining school districts.

#### Special Building Funds

Special Building Funds of 1921, 1923, 1925, and 1927 were created on the solid foundation of the Literary Loan Fund. The first three of these loan funds were for \$5 million each. The 1927 fund was for \$2.5 million.

Unhappily, the Special Building Funds were not permanent revolving funds. If they had been; availability of loans during depression years might have changed the school building problem in the state for the better. These funds for school building construction did more than make capital available for construction. Reorganization of the state's school system, according to the best thought of the time, otherwise could not have been carried out. A condition always precedent to granting loans was that the school, or schools, be built in accordance with a definite and approved countywide plan of organization. Money

was never available to independent school districts. Applications were approved only from boards of education able to show with some degree of accuracy the funds necessary for erecting and equipping new buildings, and to provide information on how the projects articulated into a countywide school system.

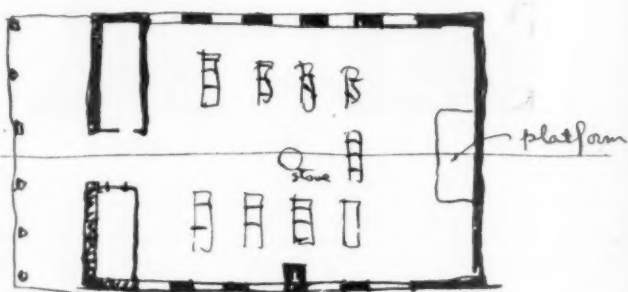
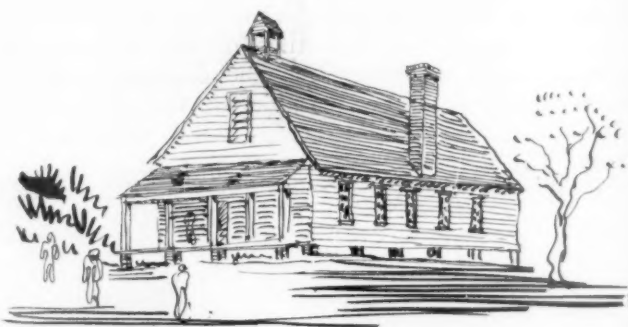
Loans were not approved from the first Special Building Fund for buildings containing fewer than five rooms. Room requirement was raised to seven for the other three funds. All buildings constructed with loans from the funds had to have modern sanitary facilities.

All school building in the state, when special funds were available, was by no means entirely financed by them. From 1921 to 1927, over \$65 million was spent for school buildings constructed in the state. Over \$30 million was for rural school buildings.

Lasting good effects of the special funds may be briefly noted. The district concept of school organization was abandoned and schools were planned on a countywide basis. Building funds stimulated consolidation, so enough children were transported to planned centers to establish standard elementary and high schools. The state has not receded its requirements that new schools be built in line with the ideas that prevailed when construction was made possible, partly or completely, by the funds.

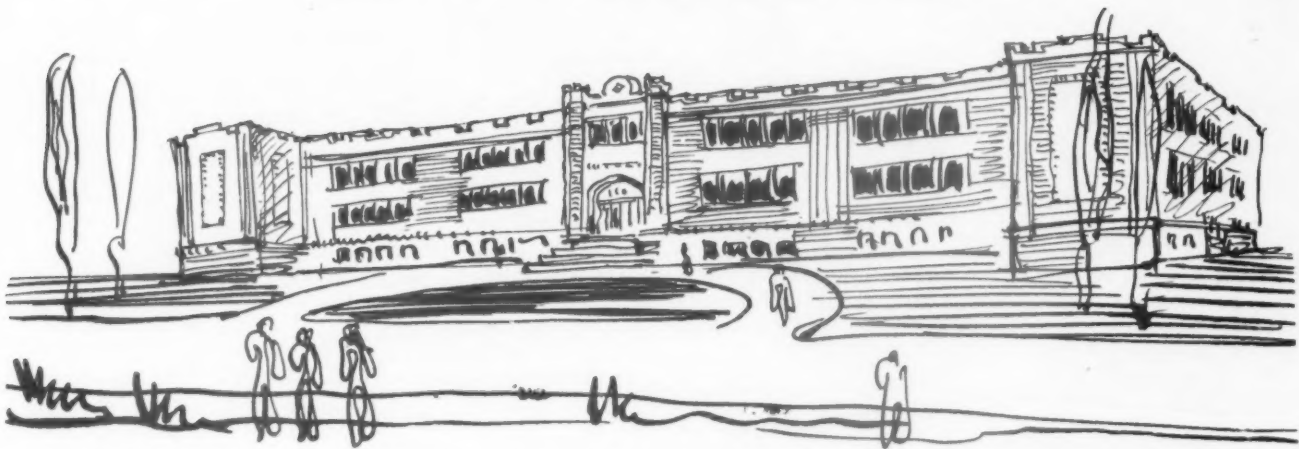
#### Schoolhouse Group Established

The Division of Schoolhouse Planning in the state department of public instruction was set up because of the impetus the funds gave school building and



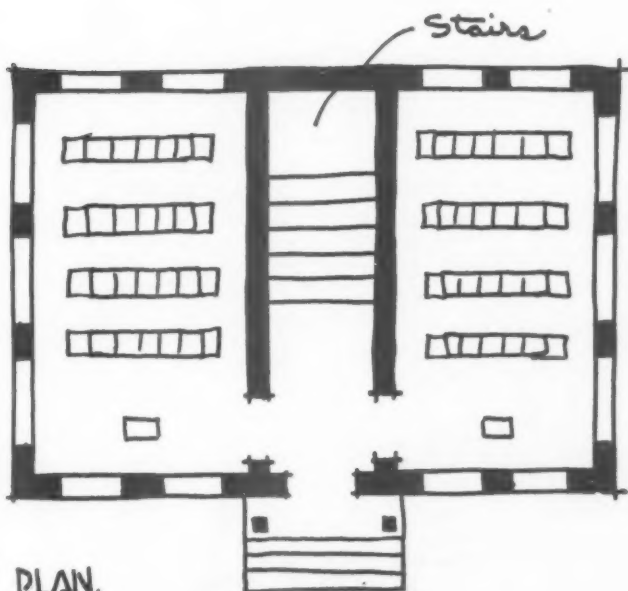
PLAN

School prior to 1900.

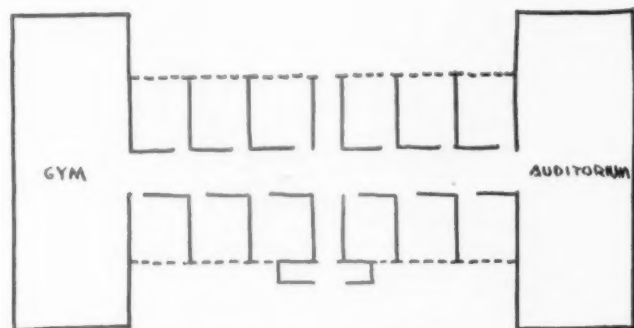


THE INFLUENCE OF THE PSEUDO-GOTHIC ARCHITECTURE OF THE COLLEGES

the progressive spirit of 1920 in the state. In 1929, however, bond issues for school building ceased. The small Literary Loan Fund was the only state building fund for schools and only limited resources existed for maintenance. School property values decreased



The old academy type.



City school between 1900 and 1925.

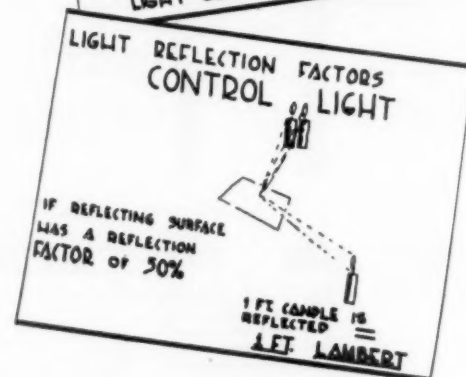
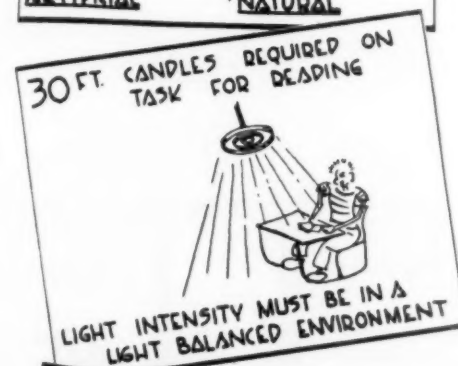
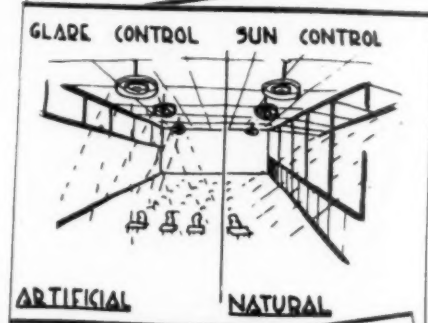
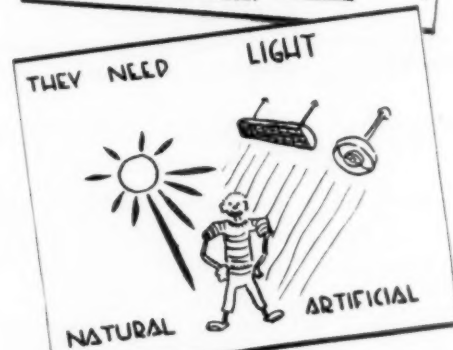
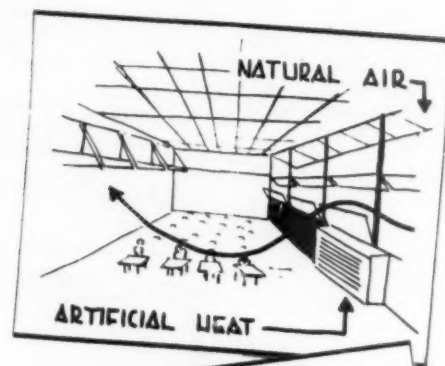
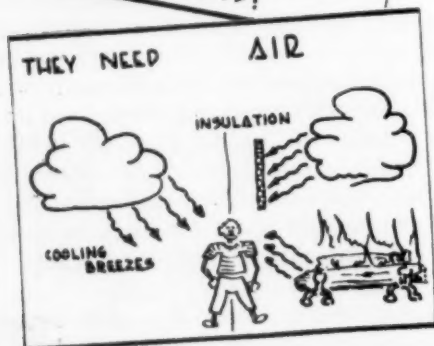
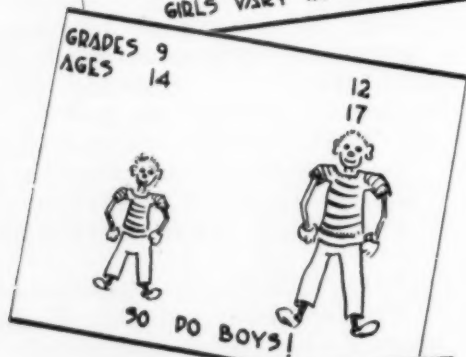
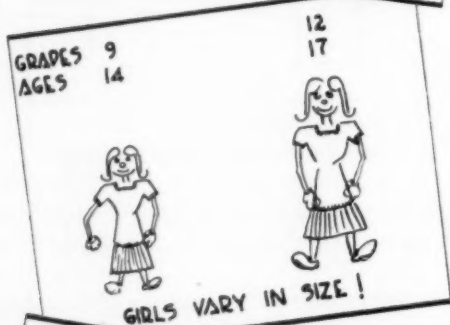
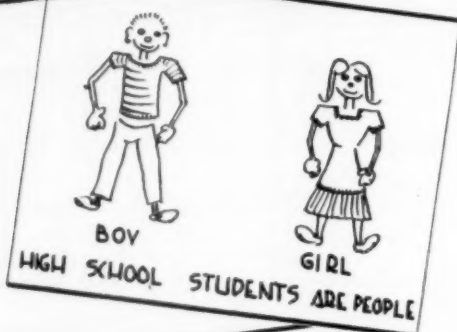
\$1 million in appraisal in North Carolina from 1930 to 1932 and an additional \$1.1 million by the end of 1933.

Federal relief agencies came to the state in 1932 and contributed greatly to solving the building problem. These various groups spent more than \$3 million on construction, maintenance, and general improvement of school plants. Total cost of buildings constructed in part by relief agencies was approximately \$7 million. The Public Works Administration gave aid to 582 schools, containing about 2,350 classrooms. PWA granted \$6 million of an estimated cost of \$14 million.

Two important factors in the development of public schools in the state should be mentioned. No public schools for Negro children existed prior to 1865. The apathy toward building schools for white children before this was not a good omen for Negro children who came into the public school system. Providing schools for Negro children would have been an impossible job if we had not had the Peabody Fund and its exceptionally wise administrators. The Peabody Fund did not make any sizeable contribution for school buildings. The money spent for teachers and normal schools had a wholesome influence and was productive of a lot of good.

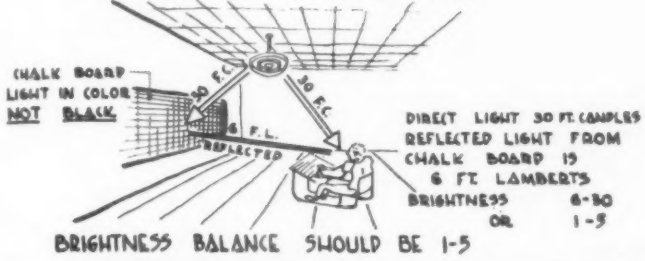
The Rosenwald Fund was the other agency that directly stimulated construction of modern schools

# DESIGNING THE INTEGRATED HIGH SCHOOL CLASSROOM

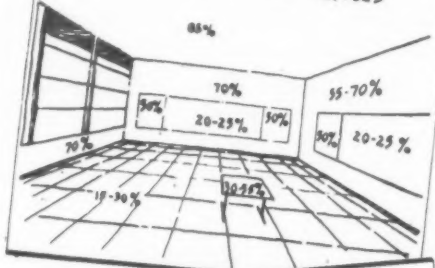




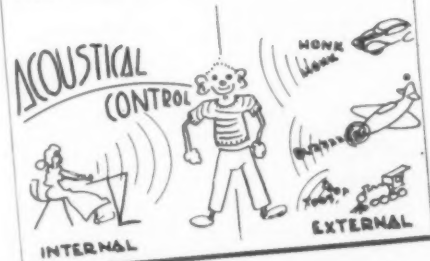
BALANCED LIGHT CONTROLS GLARE



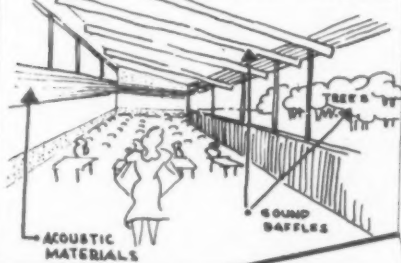
LIGHT REFLECTION FACTORS



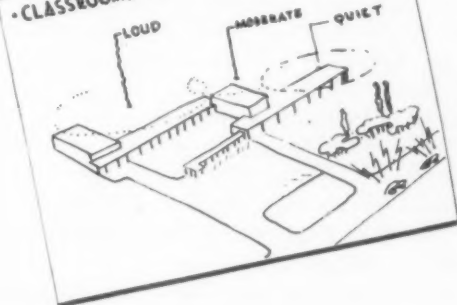
THEY NEED SOUND CONTROL



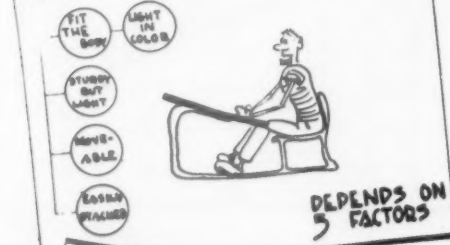
SOUND-INSULATION INSIDE CLASSROOM



CLASSROOMS IN QUIET ZONE



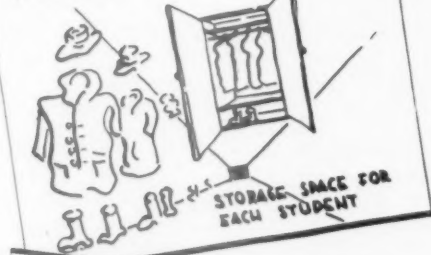
THEY NEED GOOD FURNITURE



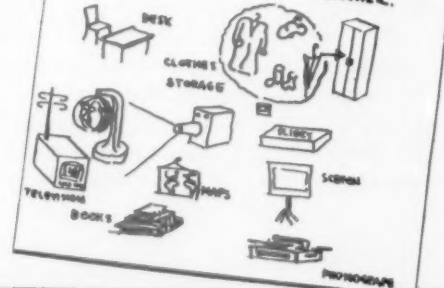
THEY NEED POSTURE COMFORT



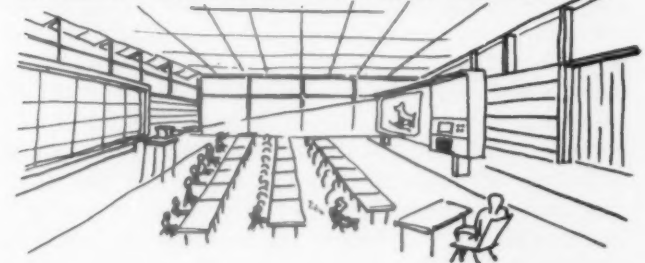
FURNITURE -

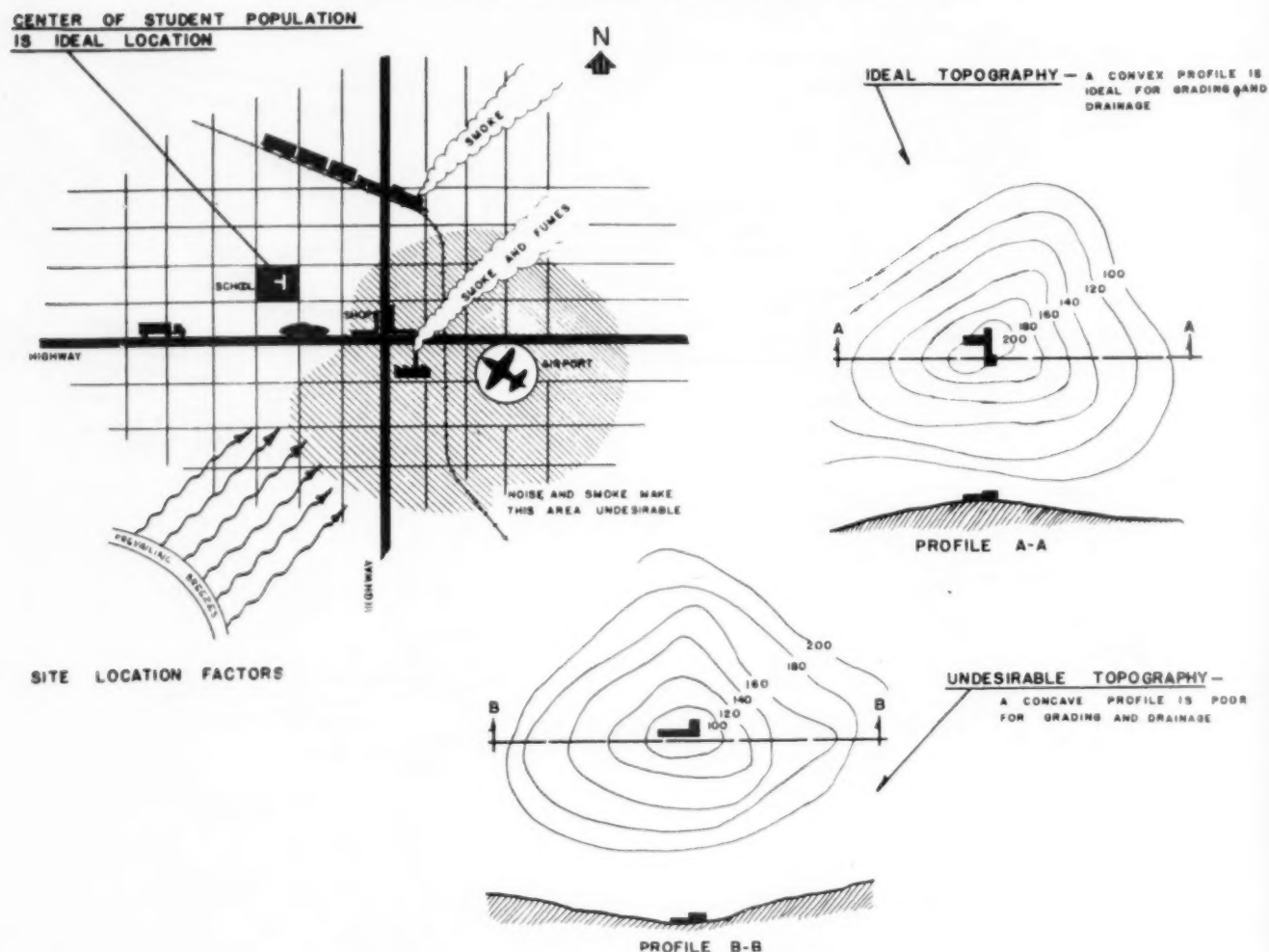


FURNITURE FOR THE TEACHER.



INTEGRATED FURNISHINGS - FOR STUDENT AND TEACHER





Choosing the site. Illustrations are from "School Design Standards" prepared by the authors for the North Carolina Division of Schoolhouse Planning.

for Negro children. This fund fortunately was established a few years after the Literary Loan Fund, prior to the creation of the special funds.

Without these two funds, the problem of Negro schooling could not have been solved as satisfactorily as it was. Negro school plants of the state, however, have never quite been on par with plants for white children.

#### An Attempt That Failed

In 1934 the Federal Relief Agencies suggested to the U. S. Office of Education that they would be interested in constructing all consolidated schoolhouses with more than five rooms.

All chief state school officials and directors of schoolhouse planning went to Washington for a conference with officials of the principal relief agency to aid in this undertaking. The conference was a dismal failure: North Carolina was one of few states to show with any accuracy the number of buildings needed and funds necessary for their construction. The project was dropped.

Failure of this program brought about an application to the Emergency Relief Administration "for the authorization of a project involving the study of local school organization and administration in 32 states, which at that time expressed the desire to participate in such a project." North Carolina took an active part in its inception. Surveys were undertaken in only ten states and North Carolina was one of them. The survey objectively revealed the critical inadequacy of the state's school plants.

In 1944 the director of schoolhouse planning for the department of public instruction made a comprehensive study of the reorganization and consolidation of Negro schools in North Carolina. It was based upon the following questions:

1. To what extent do present systems of organization of our Negro schools compare with those white schools which were studied and considered inefficient in the 1920-1930 era but since improved by reorganization and consolidation?

2. Do not the facts and our findings relative to the white schools and a number of Negro schools

Location of school by student population.



warrant our believing that much progress for a more efficient system of Negro schools would be the result of reorganization and consolidation?

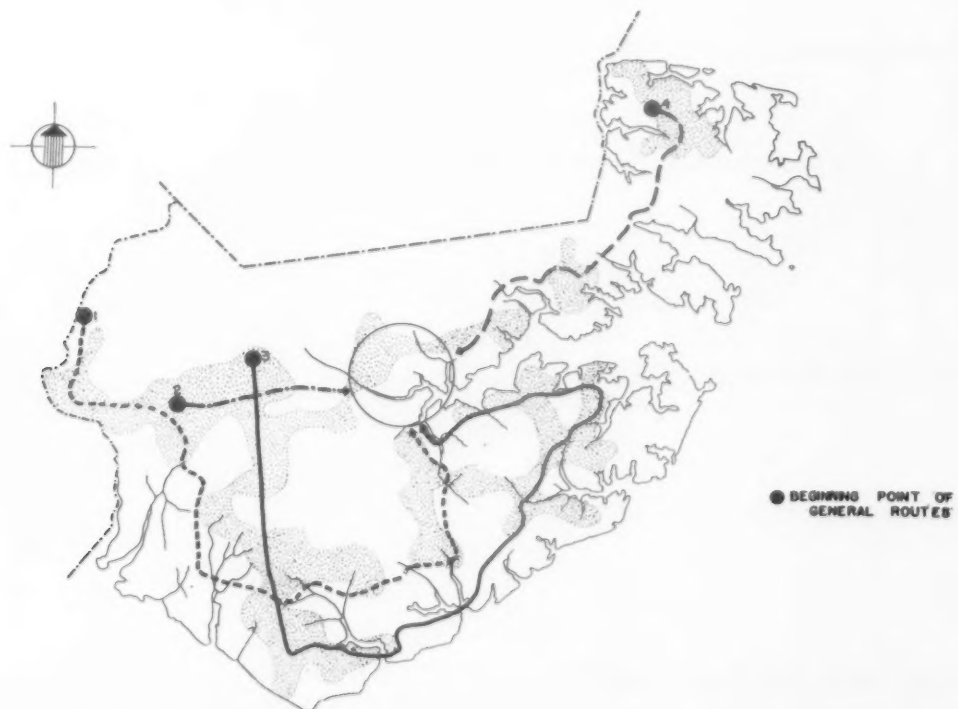
The answers in brief to these questions were contained in the recommendation that the 1,693 Negro schools be reduced to 471. Only 188, because of geographical location and sparsity of population, would have fewer than eight teachers. Significance of the report was in convincing key members of the state

board of education that the state could, in reasonable time only by a grants-in-aid program, hope to approach the realization of adequate well planned school plants for approximately one million children—Negro and white.

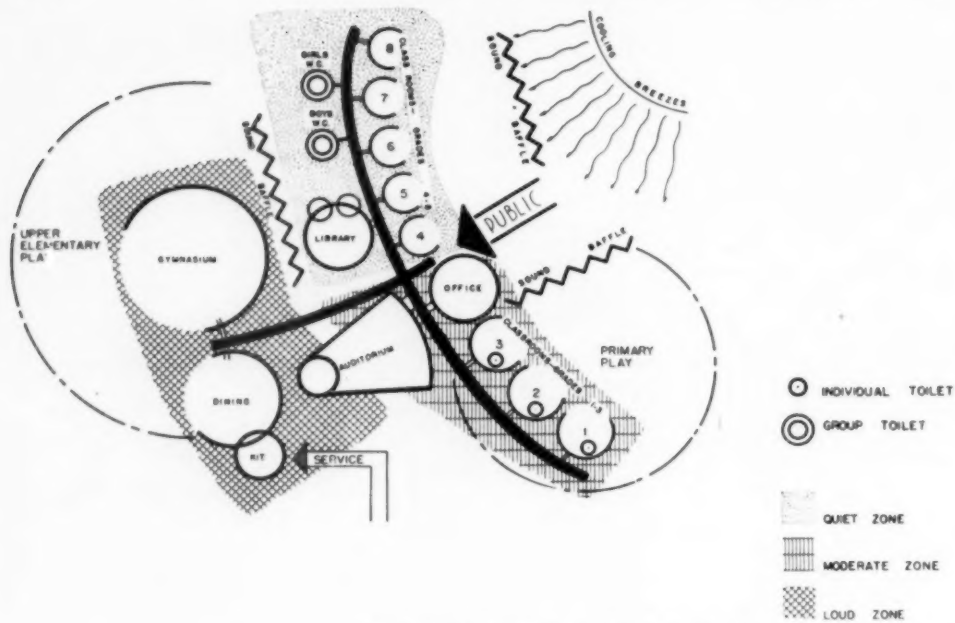
#### State Study of 1945

The 1945 session of the general assembly, by a joint resolution of the two houses, directed the state

Location of school by bus transportation.





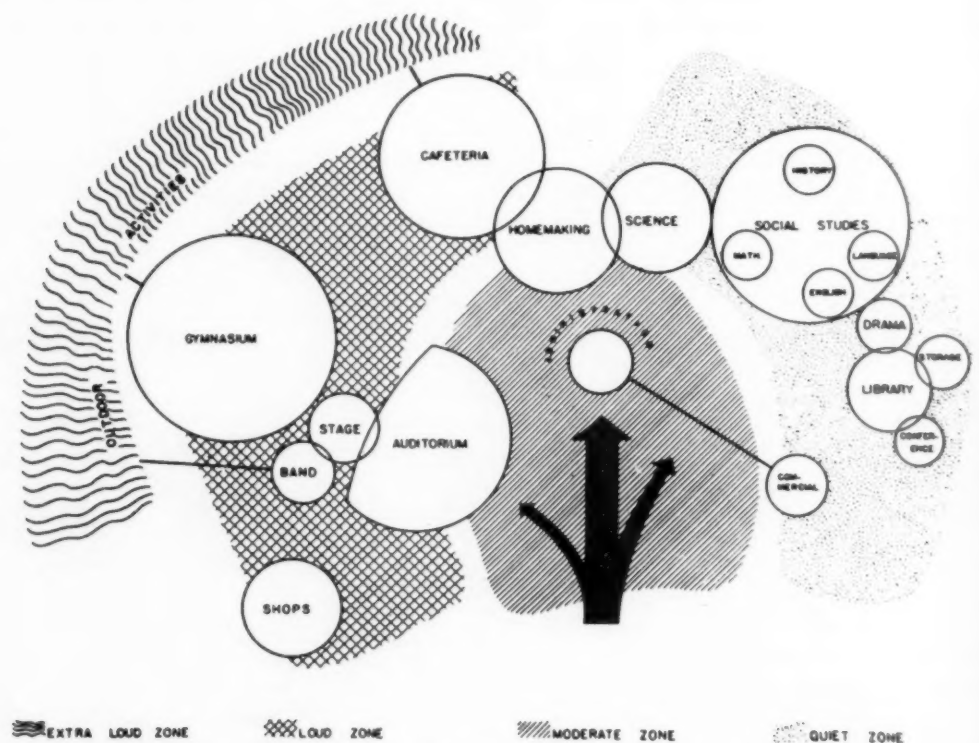


Functional affinities in planning an elementary school plant.

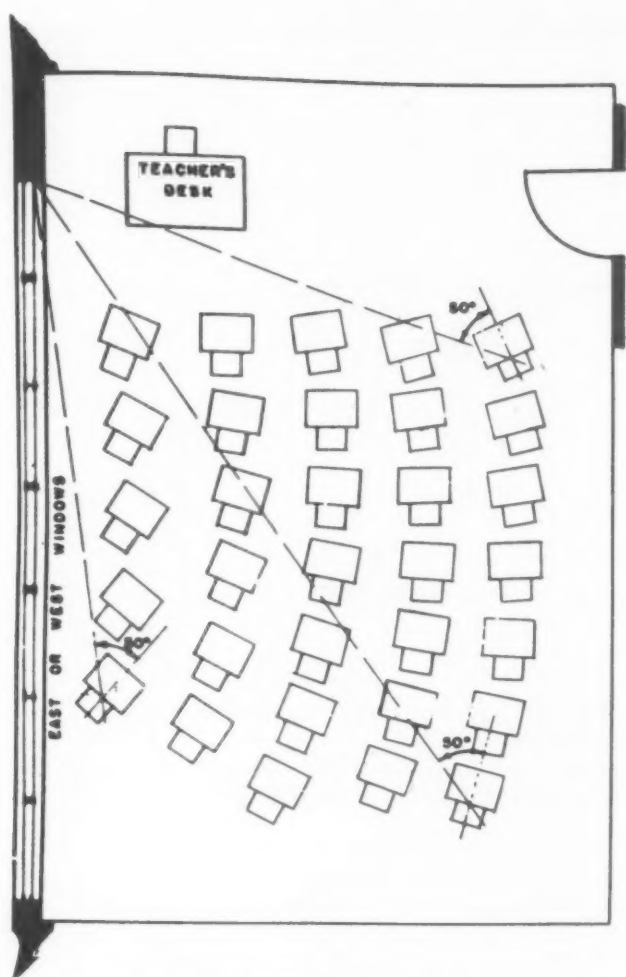
board of education to "appoint five of its members as a special committee to make careful investigation and study of the situation throughout the state, with reference to the school buildings provided for the use of the children . . . reporting back to the full state board of education their findings and recommenda-

tions as to what program should be presented to the next general assembly for consideration as to the state policy with reference thereto . . . a view of providing for a more uniform educational opportunity throughout the state."

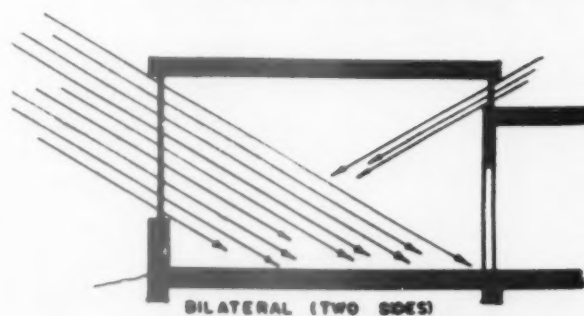
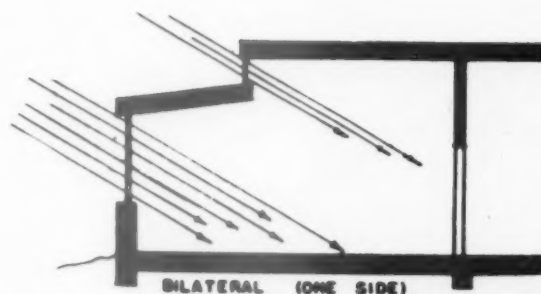
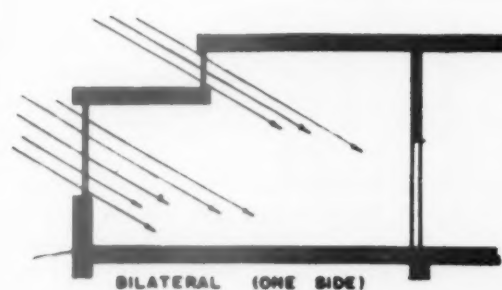
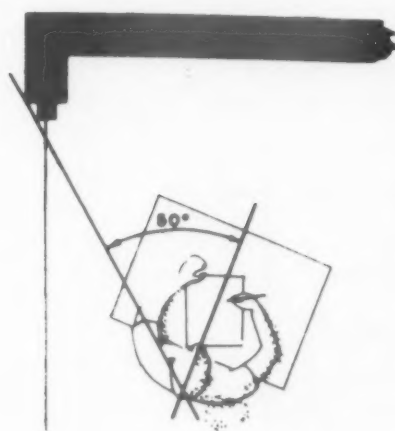
The committee was especially directed to consider:



Functional affinities in planning a high school plant.



Plan showing desk arrangement in a typical classroom. From "The Coordinated Classroom," by Darell Boyd Harmon; American Seating Company, publisher. Top of page, the rotated desk.



1. Whether the state should extend its policy of making loans for school building.

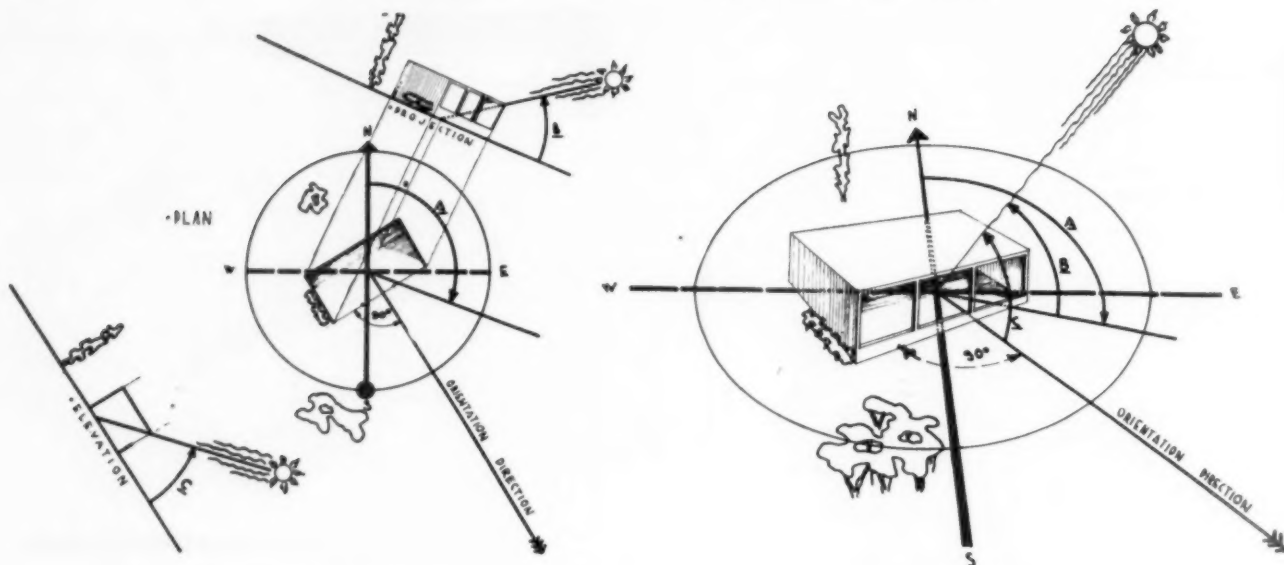
2. Whether grants-in-aid should be made to equalize educational opportunities.

3. To consider all other matters which might affect the state and counties in connection with the school building problem.

The committee of five was appointed from the state board. The director of schoolhouse planning was asked to serve as secretary. A comprehensive report was prepared according to the terms of the resolution.

At the 1947 session of the general assembly bills were introduced providing for state aid on the lines suggested by the board of education. Education committees of both house and senate made several favorable reports on the bills introduced. The appropriation and finance committees, however, did not report these bills favorably. Not until the 1949 session of the general assembly was there an appropriation for grants-in-aid to school buildings.

Funds for the School Plant Construction, Improve-



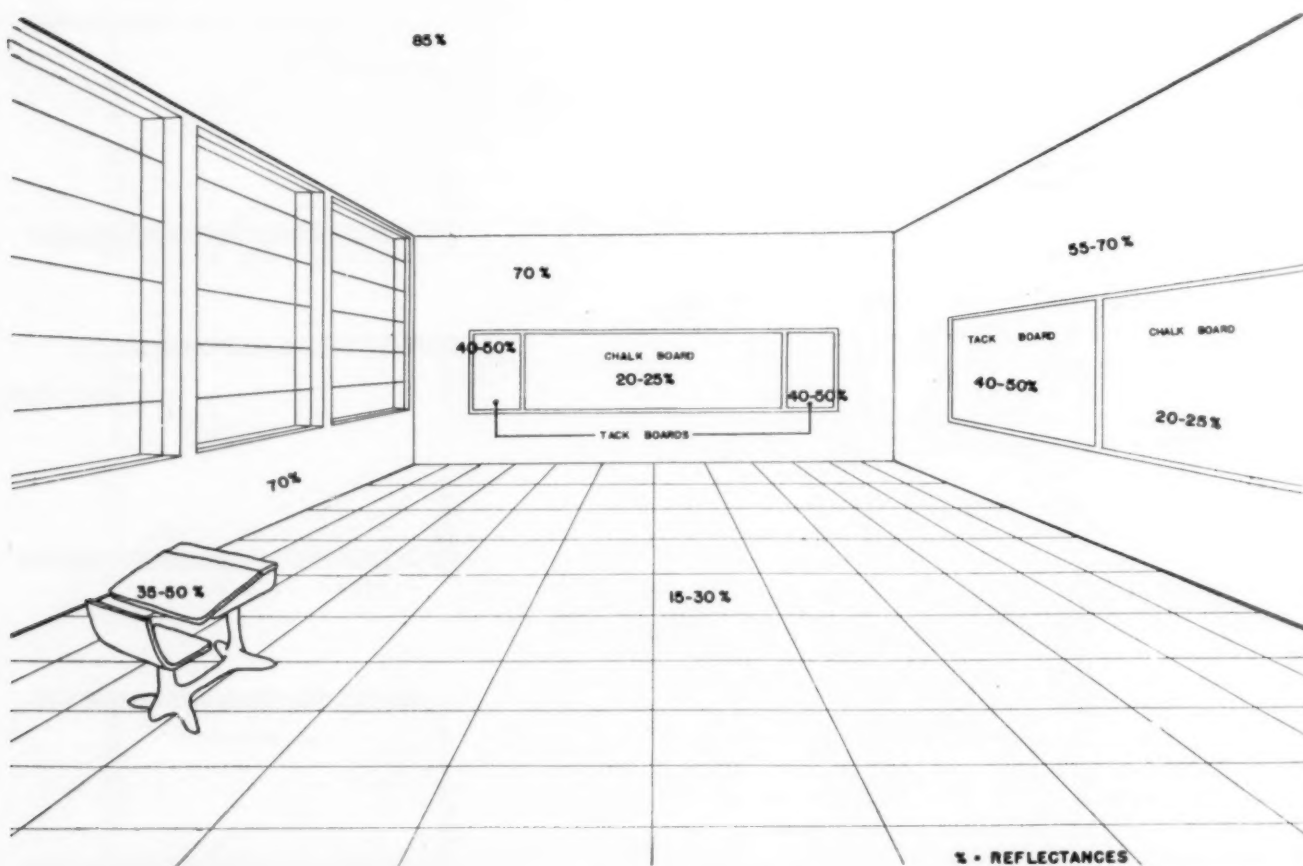
Sun control design was based on North Carolina's approximate average latitude of 35° north.

ment, and Repair Fund actually became available on July 1, 1949. Since the election authorizing \$25 million, one-half the amount, was not held until June, only very preliminary "rules and regulations" were in any way circulated prior to July 1.

#### The New Program

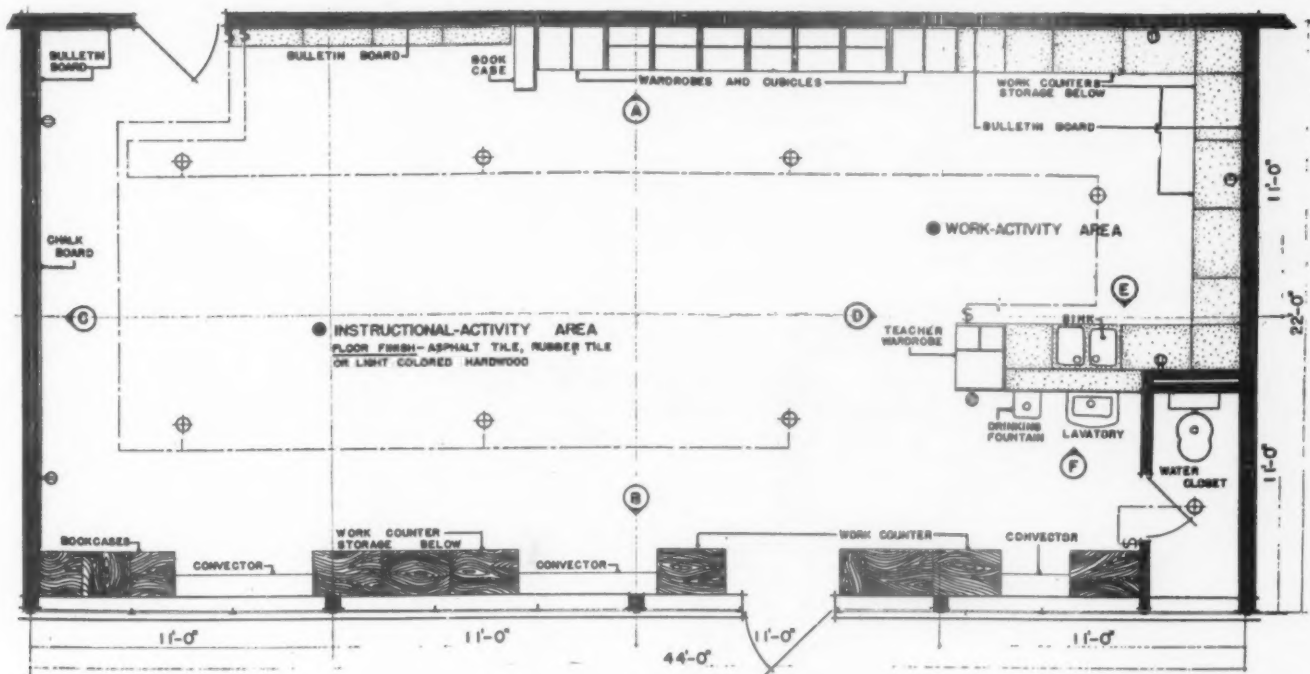
General plan for the new school building program was briefly as follows:

1. At the state level the division of schoolhouse planning was reorganized with a director, a design



Classroom light and color factors.





Primary room layout, grades 1-2-3.

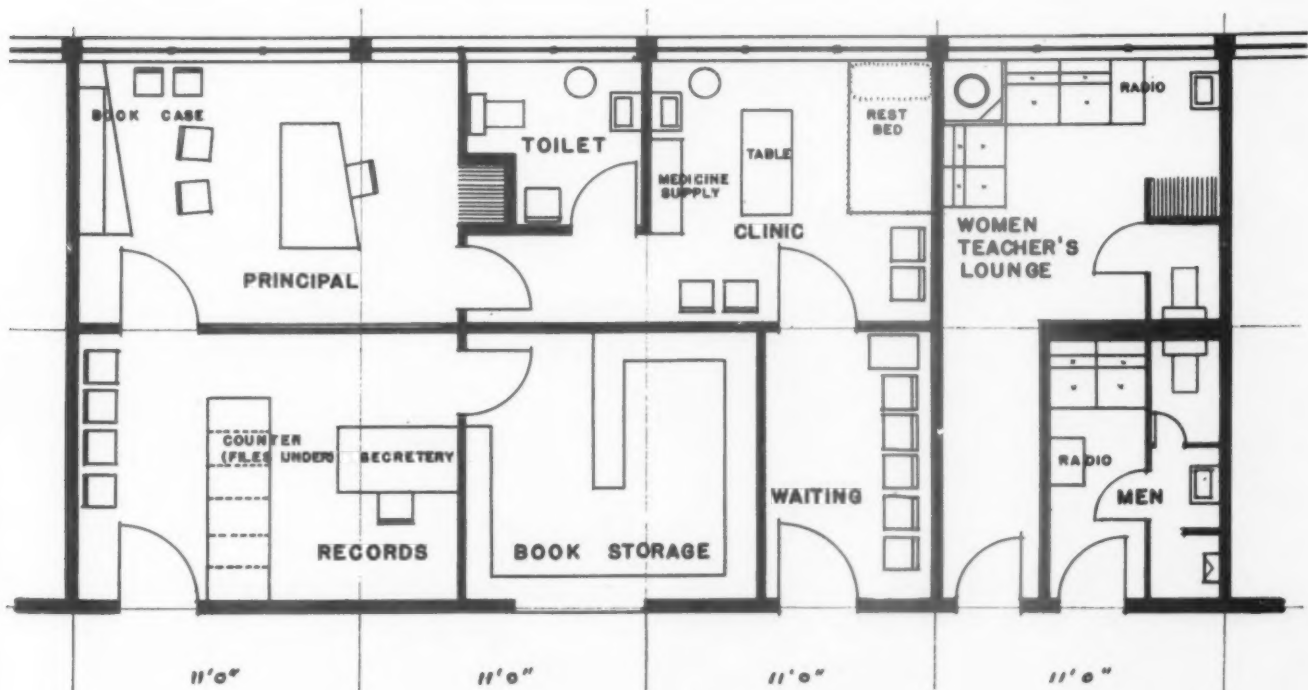
consultant, two architectural draftsmen, and two secretaries.

2. Rules and regulations supplementing and augmenting state laws requiring that plans for all buildings be drawn by architects registered to practice in the state, and all construction work be done by contractors licensed to operate in the state were promul-

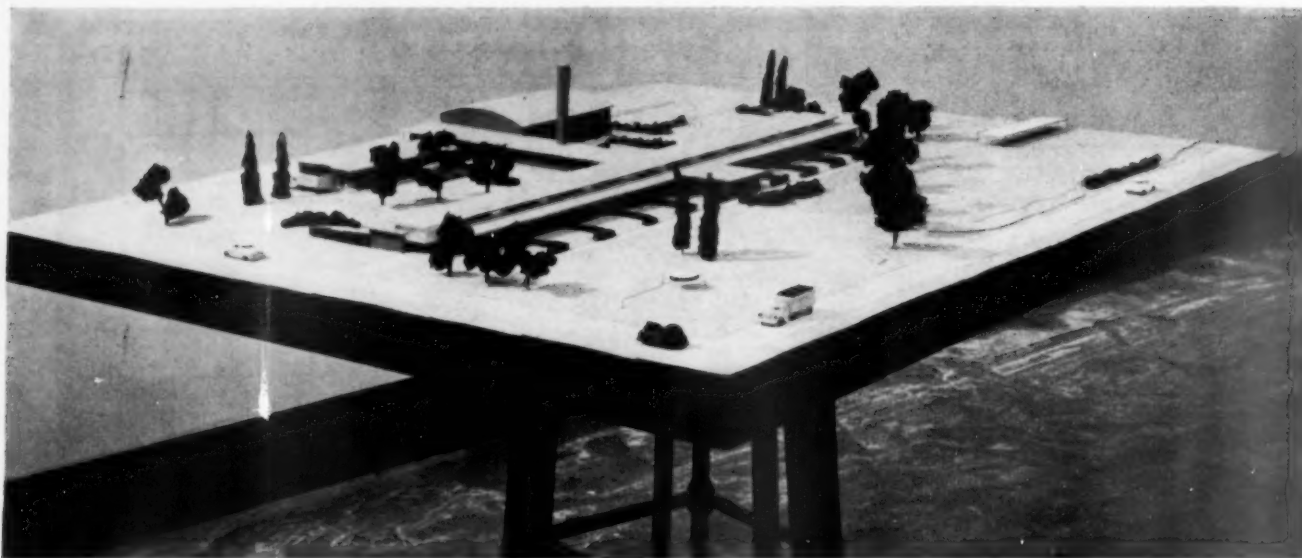
gated. (The state has ceased to supply local communities with stock plans.) Approval of plans by the state insurance department and the state board of health for fire safety and sanitation is necessary.

3. Actual working rules and regulations in force since the program was put into operation are:

a. North Carolina, through the state superintend-



A typical administrative unit.



Scale model of plot plan.

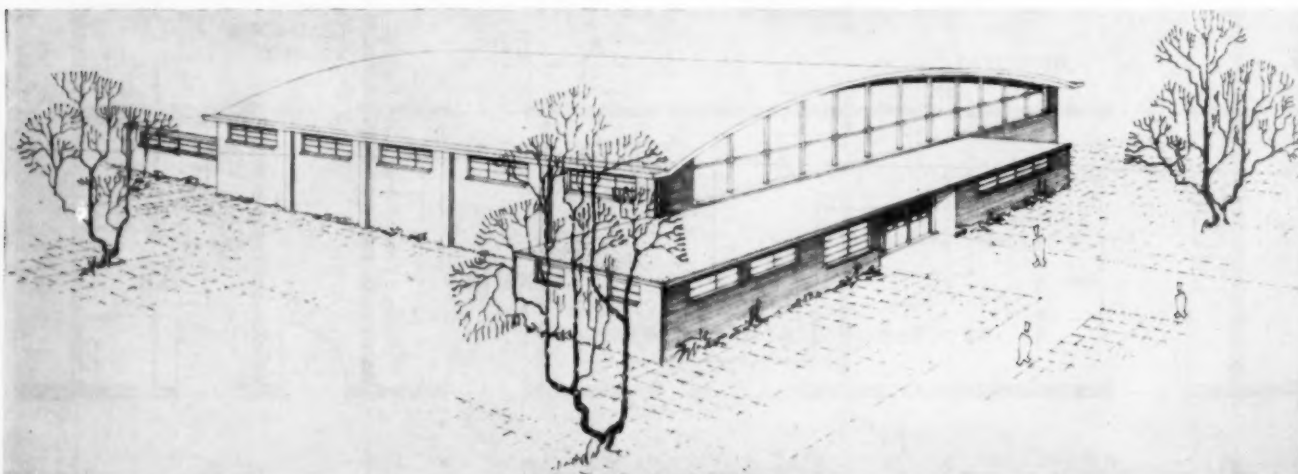
ent, state board of education and division of schoolhouse planning is committed to the contemporary, functional type of school plant.

b. To augment this philosophy an Institute of School Planning was jointly sponsored by the state department of public instruction and the North Carolina State College School of Design in November 1949. Outstanding architects and school plant hygienists assisted the college's excellent design faculty in "driving home" fundamental principles of the adopted type of school design. The meeting was largely attended.

4. In order to keep these new-to-the-state principles before architects and school administrators, the division of schoolhouse planning with the wholehearted cooperation of the state superintendent of public instruction and the state board of education is offering the following services:

a. In the field. The division of schoolhouse planning is organized and staffed so that it can assist school officials and architects in formulating their school programs before actual planning of buildings is undertaken. Location of schools is carefully studied in relation to present population and anticipated future trends. Much thought is given to obtaining sites that are accessible and yet removed from hazards of major highways, railroads, airports, and industries.

b. In the office. Architects and superintendents are encouraged to visit the division of schoolhouse planning to work out preliminary programs for their building projects. Attention is given to special requirements and functional affinities. After basic principles have been agreed upon, architects are instructed to prepare preliminary plans for proposed school plant projects. These preliminary plans must contain:



Perspective of gymnasium.

1. County or city map showing main approaches to the site.

2. A topographical plot plan showing 2-foot contour intervals, proposed driveways, walkways, and service entrances. All existing buildings should be shown and the elevations of floor levels should be indicated; also existing trees, the location of true north, and the position of all utility lines. Scale not less than  $\frac{1}{80}$  inch equals 1 foot.

3. Plans, elevations, sections, schedules.

4. Plans of all floors. Scale not less than  $\frac{1}{16}$  inch equals 1 foot.

5. At least two elevations showing all finish materials. Scale not less than  $\frac{1}{16}$  inch equals 1 foot.

6. Cross section through typical classroom wings, and longitudinal section through auditoriums and

#### Other State Services

For maximum service to school administrators and architects the division of schoolhouse planning prepares data sheets on school sites, areas for entire buildings, layouts for special departments such as libraries, home economics suites, cafeterias, primary classrooms, and general classrooms. Results of studies in lighting and color are also distributed to school officials. The data sheets, color schemes, and similar information are supplemented by space conception and scale models of entire school plants.

North Carolina is not only committed to the contemporary functional building but is insistent on one-story structures wherever possible. Since many rural schools contain grades one through twelve, efforts are



gymnasiums showing structural details, ceiling heights, window heights and types of opening sash. Scale not less than  $\frac{1}{4}$  inch equals 1 foot.

7. Layout studies of furniture showing at least one typical classroom and any special rooms such as cafeterias, kitchens, home economics, science rooms, and vocational shops.

8. A preliminary schedule showing proposed structural materials and finish materials.

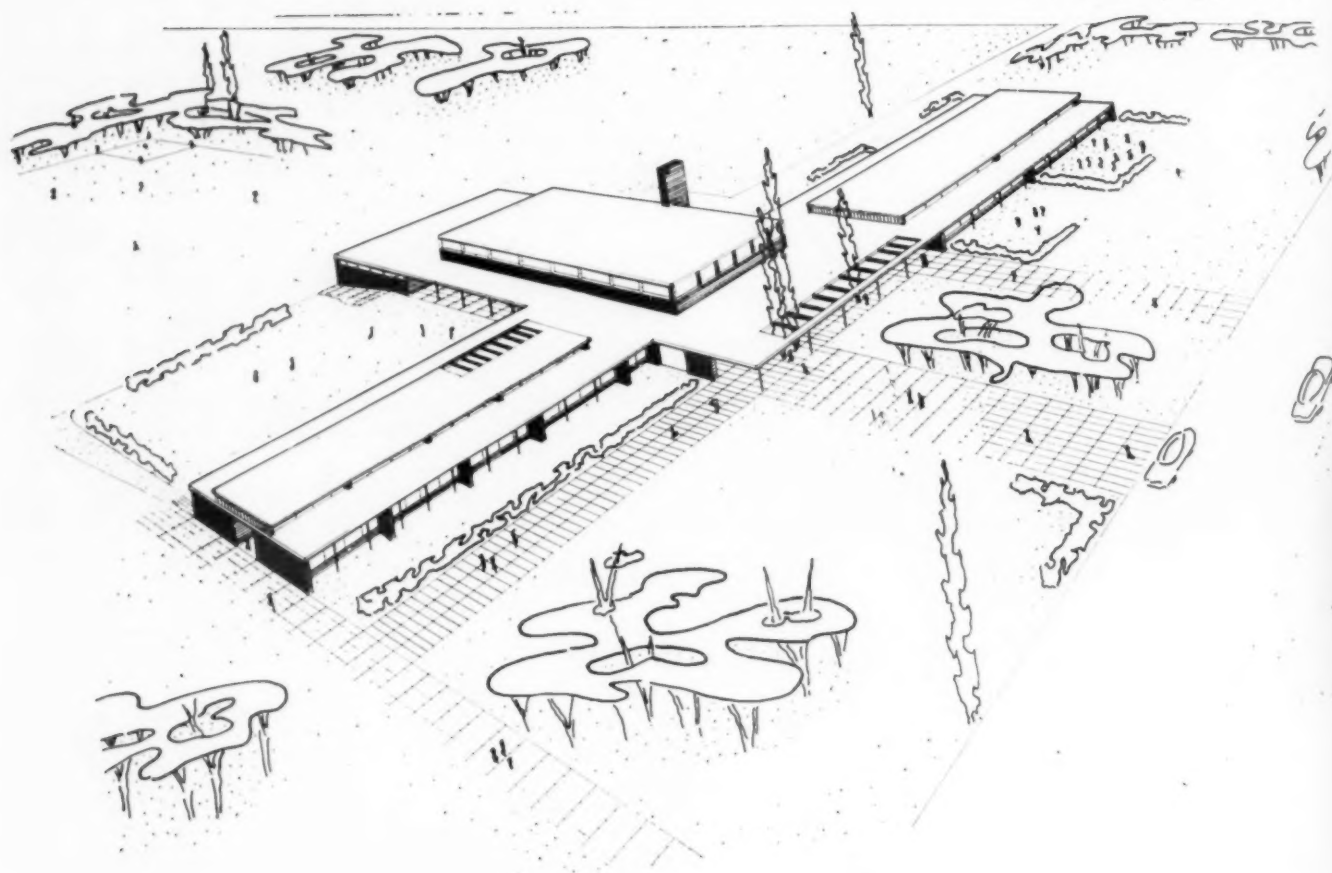
9. After preliminary plans have been completed and approved by the state superintendent of public instruction, through the division of schoolhouse planning, the architect is authorized to proceed with working drawings. These working drawings, with specifications, are studied and if found in line with approved preliminaries, they are submitted to the state board of education with an application for state grants.

made to divide school buildings into four main sections. These are roughly grades one to three, four to six, seven to eight, and nine to twelve. This arrangement has proved helpful in obtaining a good proportion of the total school plant space for the lower grades which the state deems desirable.

The state is experimenting with the double and single loaded corridors using the deep classroom with bilateral lighting. North Carolina fortunately is not confronted with a serious problem in satisfactory ventilation. We depend largely upon open windows for cooling and ventilating. Radiant heat is proving satisfactory.

North Carolina, under the state superintendent, is making grants approximating an average of \$60 to every child in the state for school buildings. Total amount of state aid available is \$50 million for 1949-





51. Many school leaders were afraid that because the legislators failed to require matching on the part of the local units these units would say "let the state do it." This is not proving true. The 100 county school administrative units and the 72 city school

administrative units locally will provide, on a voluntary basis, approximately \$100 million to supplement the \$50 million provided by the state. People of North Carolina are exerting every effort to provide adequate school buildings for their school children.



Exterior view of Henry Halgh School, Dearborn, Michigan.

## THE CURRENT SCHOOL BUILDING PROGRAM IN MICHIGAN

By WILFRED F. CLAPP

Assistant Superintendent, Department of Public Instruction, Lansing, Michigan

**M**ICHIGAN school districts are engaged in the most extensive school building program in the history of the state. Dollar volume of construction during the present fiscal year probably will exceed \$40 million.

The principal reason for this program is that almost no school building has been done in Michigan since 1932. In November of that year the people passed a constitutional amendment to limit the amount of taxes of real property for county, township, and school district purposes to \$15 per thousand valuation. Taxes for cities and villages with their own charter limitations were excepted. The amendment provided that the fifteen-mill ceiling on taxes could be raised to not more than fifty mills for not more than five years by a two-thirds majority of those present and voting.

The measure was passed in a depression hysteria because real estate taxes had been paying too great a



Mr. Clapp, who is Assistant Superintendent of Public Instruction in charge of School Organization and Plant, received his A.B. degree at Kalamazoo College and his M.A. at the University of Michigan. From 1931 to 1937 he was Superintendent of Schools in Ovid, Michigan. Since 1937 he has been with the Michigan Department of Public Instruction except for two of the war years when he was Senior Specialist on School Facilities with the U.S. Office of Education.

share of the total cost of government. It had the practical effect of stopping all school building. A two-to-one majority was in many cases impossible to obtain, especially when a proposed bond issue had to be repaid in five years. Paying for a major school building program in five years would be well nigh impossible except in wealthy districts and persuading two out of three voters to approve the kind of a tax increase necessary would be equally difficult.

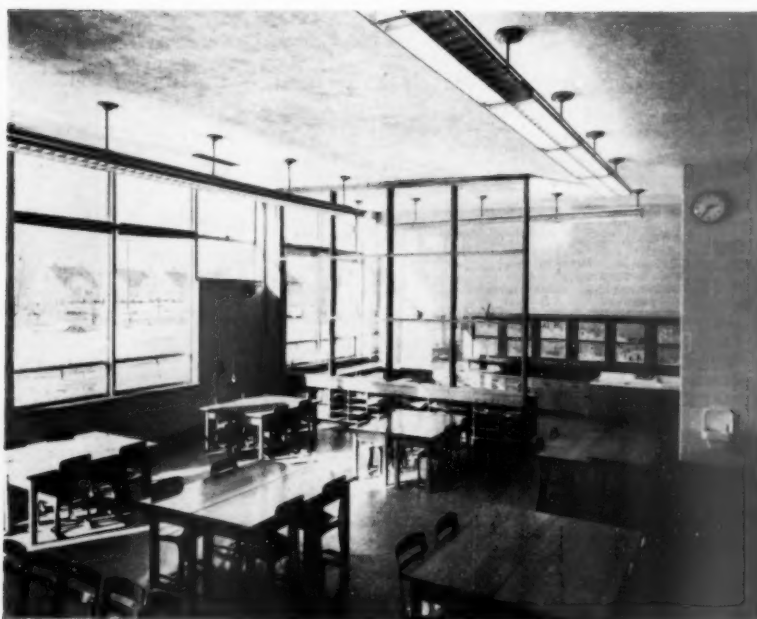
Classroom



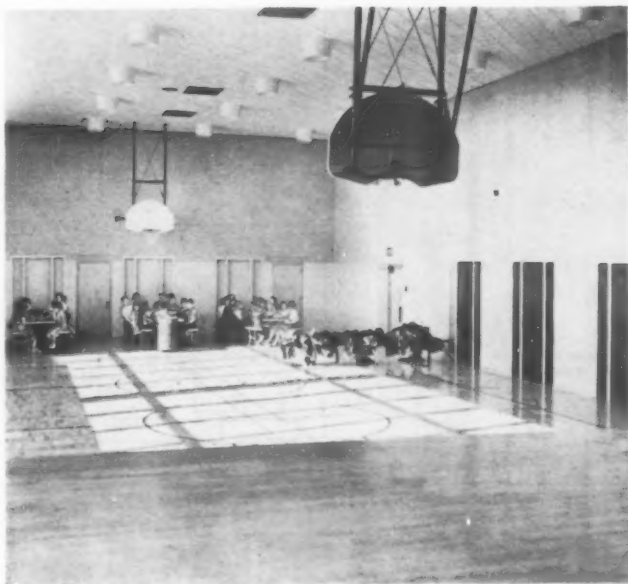
Typical corridor



Classrooms have individual drinking fountains.



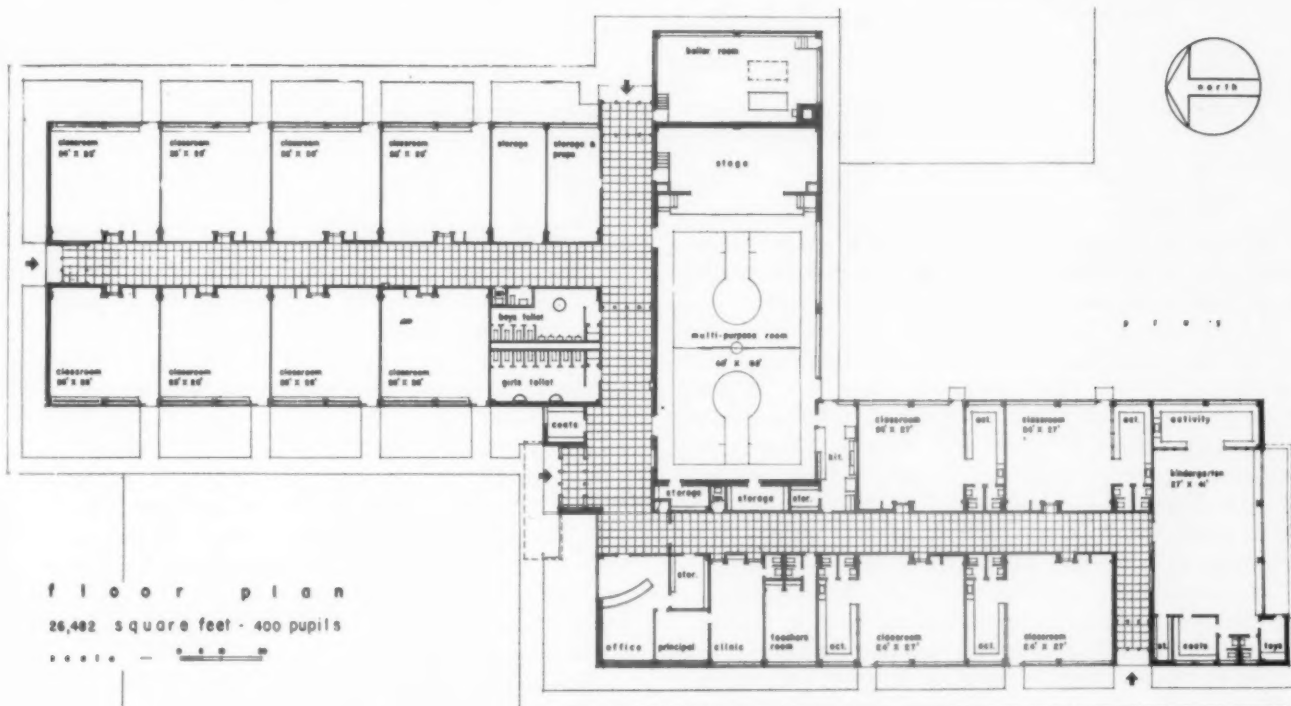




Multi-purpose room

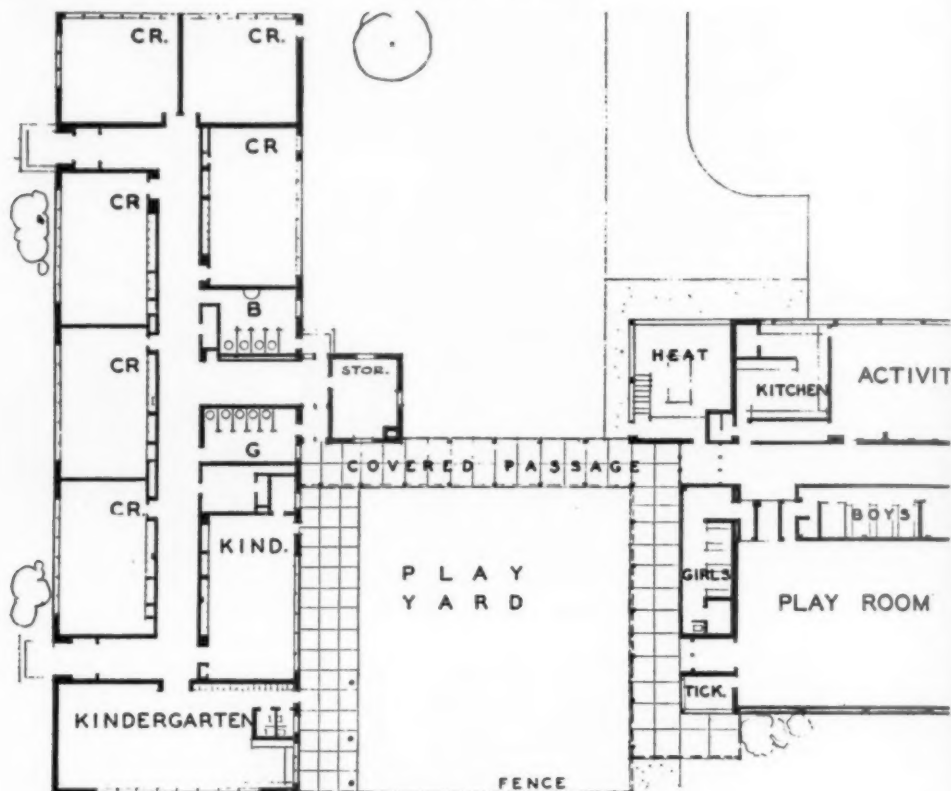


Main entrance



The Lockman School, Royal Oaks, Michigan—east elevation.





During the days of federal matching programs, Michigan school districts in most cases were unable to provide their portion of the cost of a project.

A tremendous building need has resulted from tax limitation, depression, war years, and lately a sharp increase in the birth rate. From the birth rate increase alone it is apparent that space for 157,000 additional elementary school children will have to be provided within the next four years. A conservative estimate of \$400 million has been made for the cost of placing Michigan's total school plant in reasonably good condition in the next few years.

The Legislature and the people of the state finally realized the seriousness of the situation. In November 1948 they voted to revise the tax limitation provision so that a simple majority of those present and voting could raise the tax ceiling for a period not to exceed twenty years. Relaxation of the tax limitation almost immediately brought a flood of bond issues and building projects.

Although a few senior and junior high schools are in plan and construction, elementary school buildings constitute the bulk of present construction. There are several reasons.

#### Youngest First

The greatest immediate need is space for young children. During the 1920's when there was also a large volume of construction in Michigan, space was needed to accommodate increased numbers of second-

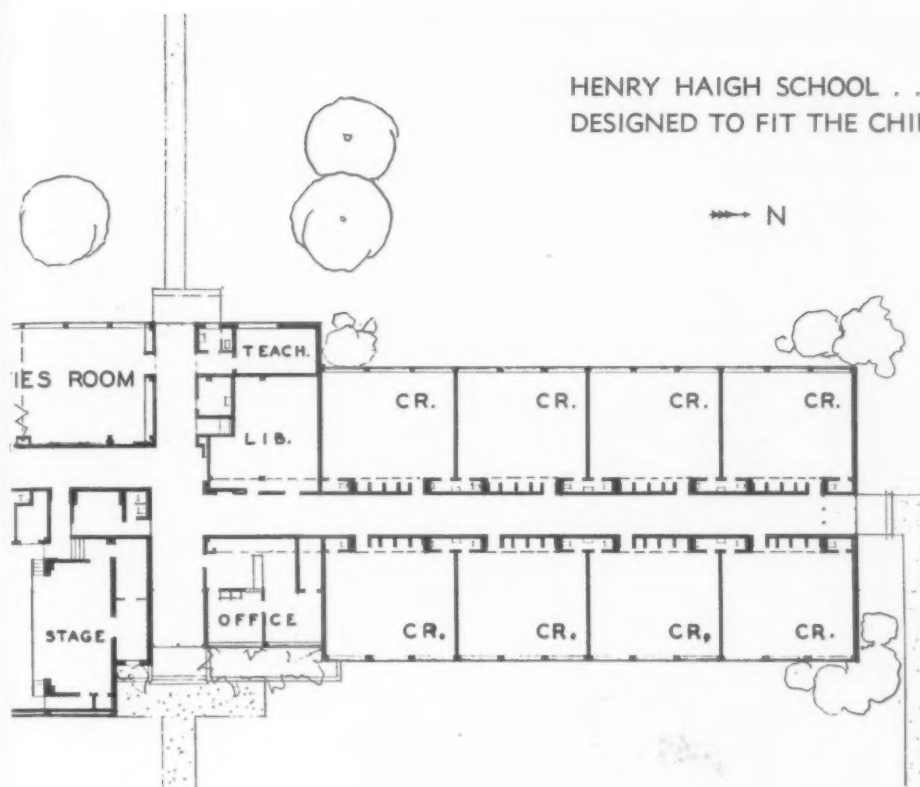
ary school pupils who wanted to continue their education beyond the eighth grade. Consequently, many communities constructed high school plants and decided that the space abandoned by the high school would do "for the time being" for elementary school children. It is now more apparent than it was in the twenties that these buildings are obsolete, inadequate, sometimes unsafe, and certainly not well suited to young children.

The most critical need for school buildings is in suburban metropolitan areas. There has been a great shift of population—mostly young married people—to these areas where many new homes are being built. Additional elementary school classrooms are a continuing need there.

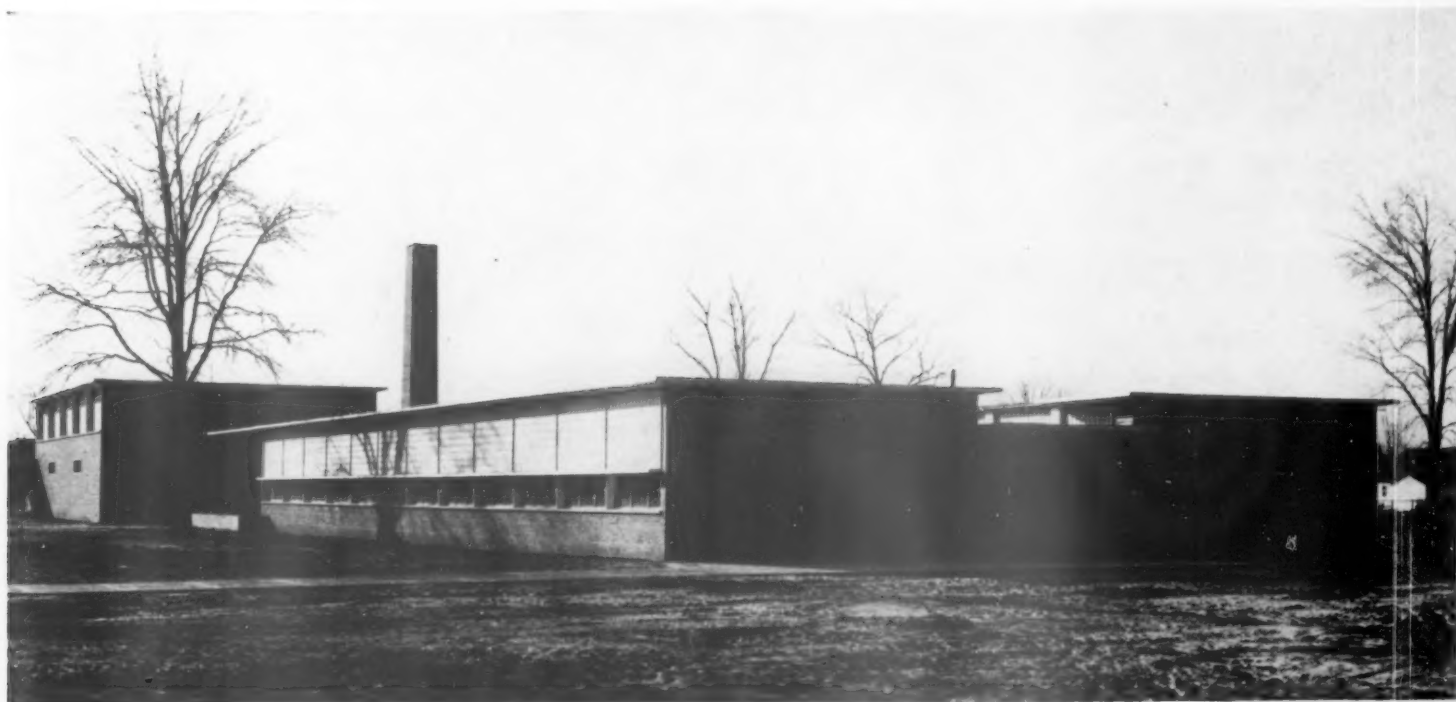
The public and school officials now consider adequate elementary schools the first and most important obligation of any school district. Schools must be safe, comfortable, useful, friendly, and inviting to elementary pupils. Besides, the comparatively lower cost per child is no small part of decisions to construct elementary schools now. A few years ago high schools had priority and younger children put up with what was left.

Future organization of secondary education and location of high school centers are uncertain. Students of education concede that the small high school cannot meet educational demands of today's and tomorrow's world. A few communities so small that the operation of a high school is educationally unsound

HENRY HAIGH SCHOOL . . .  
DESIGNED TO FIT THE CHILD



One-story school building—the Henry Haigh School, Dearborn, Michigan, features the integrated classroom plan.







The Henry Haigh School, Dearborn, Michigan, uses glass block clerestory lighting. A portion of the play room appears in foreground.

insist upon building new high schools in self-defense. Most boards of education, however, who feel responsibility to spend public funds wisely for a building they will always need, are deciding to construct elementary schools first. High school construction is postponed until the future pattern of secondary schools is clarified.

Uncertainty also exists on the upper limit of secondary education and how the school will be organized. The thirteenth and fourteenth grades or community college extension soon will be here. What are minimum population requirements for the drawing area of a community college? Twenty-five or fifty thousand? How many community colleges in Michigan and where should they be? Should the community college include grades thirteen and fourteen? Should there be a break from general education to more specialized education at the end of the tenth grade with the community college including grades eleven through fourteen? What about the program of the community college? What effect does the increasing

frequency of core courses, common problems courses, unified studies—in other words integration—have upon the design of the future high school plant?

Certainly one hesitates to commit oneself in bricks and stone until the answers to some questions are more clear. When a community can solve its problem at least for a few years by providing new elementary school space it would appear wise to do so.

#### Trends in Planning

There are certain discernible trends in school plant planning. Cooperative planning of school buildings of course might be anticipated with the growing realization of the philosophical and practical soundness of democracy in school administration. This has gone beyond the slogan or verbalizing stage in some school systems and is actually working. A staff accustomed to facing its problems democratically might be expected to move easily into cooperative planning. Significant advances in school plant design will come from such groups. School administrators are realizing

that a school plant for a certain community must be planned by that community to fit its own program and needs. Copying someone else's building will not work. Cooperative planning procedures are not yet general and the planning process in many cases is still weak, but a trend in the right direction is noticeable.

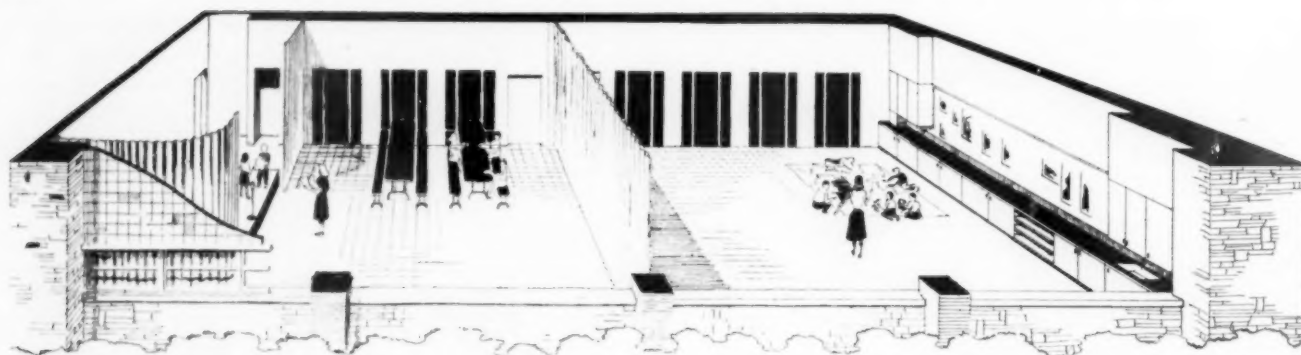
The one-story building is becoming accepted. Without discussing at length advantages and disadvantages, I offer the following advantages that are accepted with increasing conviction. It is safer than a multi-story school. Its architecture can be more friendly,

more inviting, less forbidding and institutional, especially to small children. One-story construction makes possible functional design of space. Room widths and sizes do not have to be limited by a pre-conceived building pattern. Construction is less expensive—still debatable, but experience seems to confirm this statement. More daylight, better distributed and controlled, and simplified ventilating problems characterize its rooms.

Smaller neighborhood units, especially for smaller children, are becoming more common. Even where



Youngster-size work sink and counters are featured in Henry Haigh School. Storage units are under the counters.



Activities Room plan for elementary schools. Functions include art center, little theater, games and music, audio-visual, special classes, community meetings. Room may also be used for school lunch and community dinners. It is 30 feet by 60 feet.

Equipment features are darkened shades, folding partition, work sink, recessed tables, portable tables, small hydraulic stage with curtains, lights, and p. a. outlet. Art section at one end has ample storage cabinets of various sizes for materials.

population density or other factors necessitate housing many children on one site a spread-out plant with wings or units provides a more friendly, less institutional atmosphere. Neighborhood units for young children are increasing in large consolidations, as contrasted with the former practice of transporting all children to one large building.

The self-contained classroom is developing. Here are its characteristics. Added size. "Standard" size used to be about 22 feet by 30 feet. Classrooms 28 feet by 28 feet, 30 feet by 30 feet, and even larger are now common. One school system in Michigan is building a neighborhood unit with classrooms 1200 square feet or more. Square rather than rectangular rooms are preferred. A 1200 square foot rectangular room 22 feet wide would have to be over 54 feet in length: an unwieldy shape that practically forces seating children in rows with the teacher's desk at one end of the room. Acoustics and room control are difficult. The square room requires less linear feet of wall space per square foot of floor space, invites natural groups and informal procedures. The self-contained room is complete with all facilities to make it a learning and living space. Toilets adjoin each room. Furniture is movable and not one type. Each room will have a work sink and drinking fountain. Cabinet, book shelf, storage, tackboard and work space are provided in abundance. A separate exit in many rooms leads directly outdoors. Flexibility of interior arrangement is increased with increased provision of freestanding cabinet work.

There is a trend toward simplified construction methods. Many buildings are now constructed without plastering. Interior walls are cinder block carefully laid up with tooled joints, painted in pastel colors with non-bridging paint. Ceilings are acoustical tile. Ventilation and heating problems are simplified. Radiant panel heating is used more. In some smaller buildings with panel heating, window ventilation through projected sash in main windows and in

the clerestory appears to be working well, even in the Michigan climate.

Visual conditions are receiving attention. School planners are thinking beyond the wattage of light fixtures and square footage of window area. They are now considering coordination of all factors that affect visual classroom environment. These include outdoor surroundings, orientation of the building, climatic conditions, window design, distribution and control of daylight; ceiling, wall, and floor finishes, and light fixtures design. Each building is a separate problem. Blind adoption of certain techniques, materials, and gadgets is not enough. The objective is to design a classroom so that children may sit, stand, and work in any position in that classroom with visual comfort.

#### Role of State Office of Public Instruction

The State Education Authority has a major role in this volume of new construction. The responsibility for planning buildings is and should remain primarily a local one. But the operating philosophy, adequacy, and competency of the staff as well as the regulatory responsibility of the State Department will have a major effect on school building planning.

Service to local school districts is the concept dominating the operating philosophy of the Michigan Department of Public Instruction. The job of the school plant section of the Department is helping school authorities and architects plan buildings according to local educational programs and needs. Although the office does have the important function of approving plans and specifications for all school buildings, public and private, before construction begins, this role does not in any way remove the responsibility of local authorities for the planning of their own school buildings. Some service activities are described here.

There are office conferences and correspondence with those planning school buildings regarding problems in this field. Field visits are made on request to appraise existing buildings, sites, proposed sites,

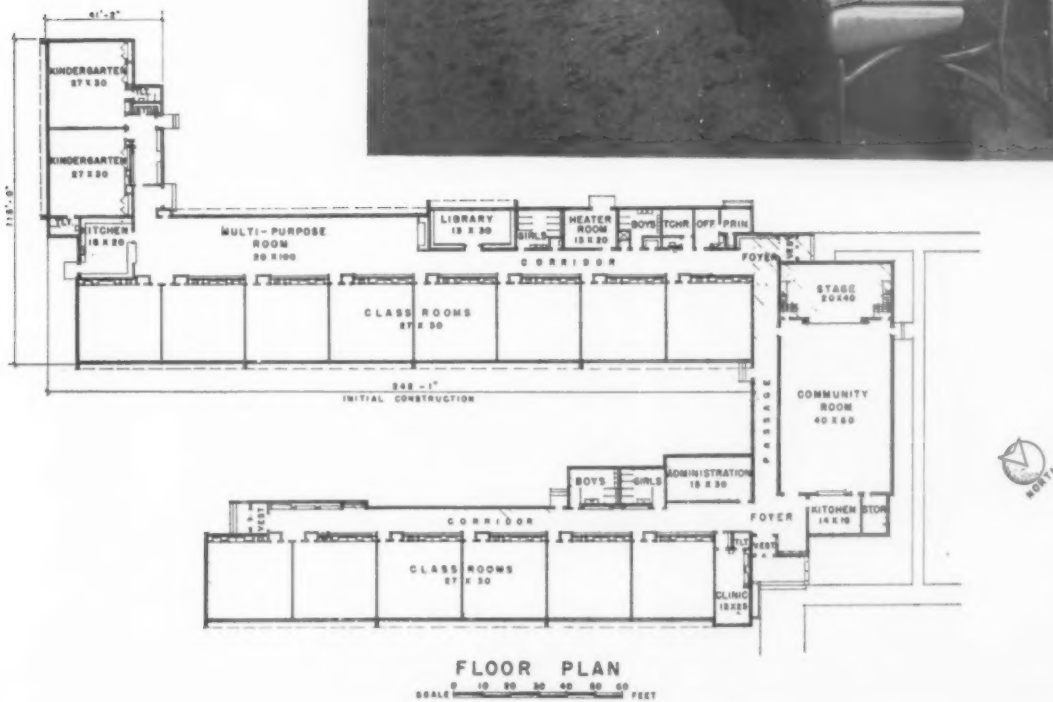




Maple Grove School near Lansing, Michigan. Above, exterior view.



Right, classroom interior.





The Lincoln Elementary School, Dowagiac, Michigan. Exterior of incomplete construction as viewed from the southeast.

give advice on long-term plans and building procedures, and to work with local officials and groups on planning specific buildings. School districts may be assisted in outlining school plant surveys, studying data, and formulating recommendations.

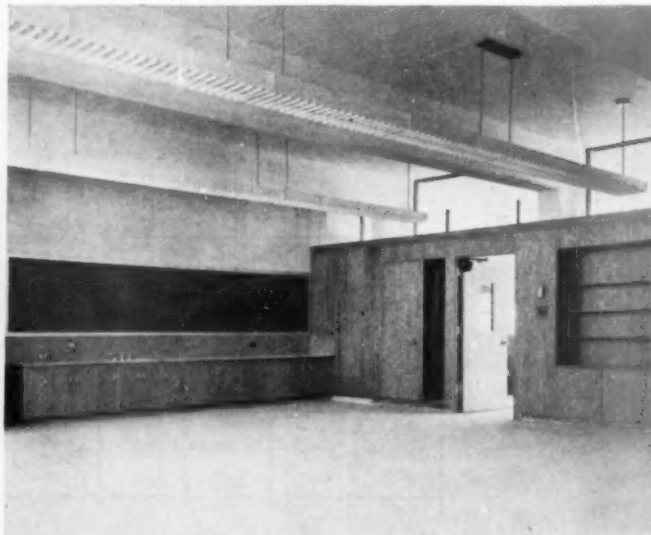
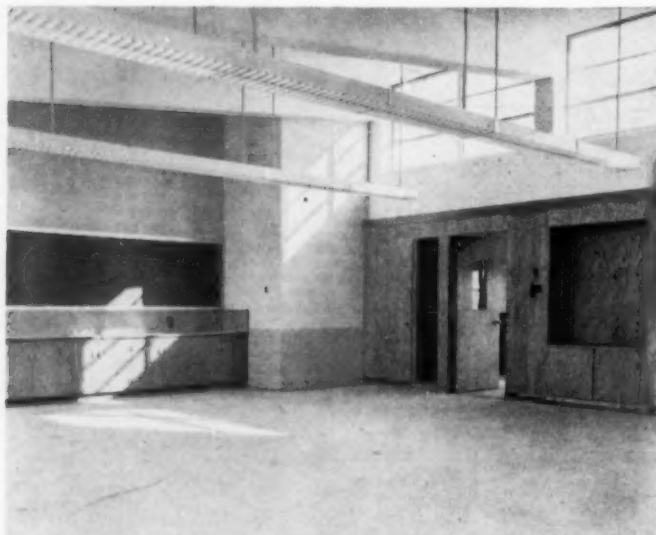
The office publishes *A Guide for Planning School Buildings*. It was originally published in 1945 but soon went out of print. The bulletin, revised extensively, is being reprinted. Both the original and its revision were prepared by committees including schoolpeople, architects, and state agencies. The bulletin is an informative code, more than a series of minimum requirements. It emphasizes performance standards, principles, and reasons why rather than numerical standards. It is intended to stimulate creative efforts by school planners, not to freeze design.

Any such bulletin cannot cover all desirable features of different classrooms such as shop, science, music,

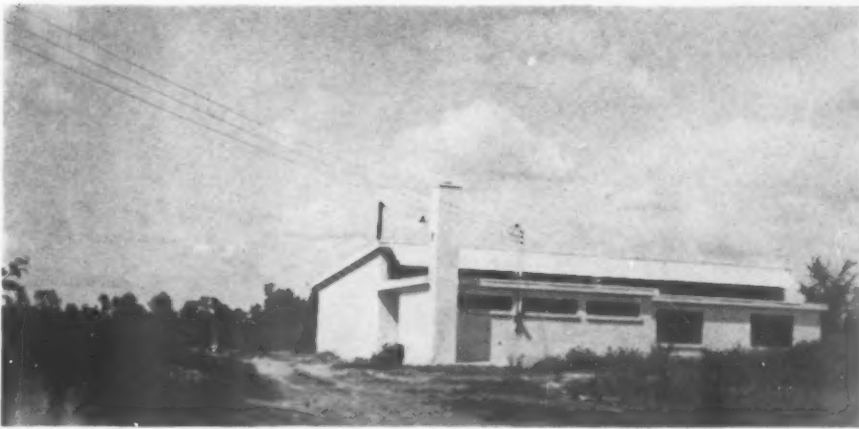
and so forth. In the future other publications may be issued on planning different features.

#### School Plant Conferences

The staff of the office encourages and takes part in school plant conferences sponsored by universities, colleges, and other groups. The office recently sponsored a two-day workshop on school building planning at St. Mary's Lake Camp near Battle Creek. Attendance was open to representatives of architectural firms doing work in Michigan, to school board members, school superintendents, and others whom they might designate. The staff included members of the Department of Public Instruction and Ray Hamon of the U. S. Office of Education. Approximately 100 attended, about twenty-five of whom were architects. The program was purposely flexible and was formulated by a planning group according to



Classrooms, when finished, will have asphalt tile floors, acoustic tile ceiling, and painted block walls.



Lake View Elementary School, Silver Creek Township, Cass County, Michigan. Above, southwest view of the exterior.



Right, detail of extended wood louvered sun shade on south clerestory.

Below, wardrobes and casework under clerestory still to be added. School opened September, 1949.



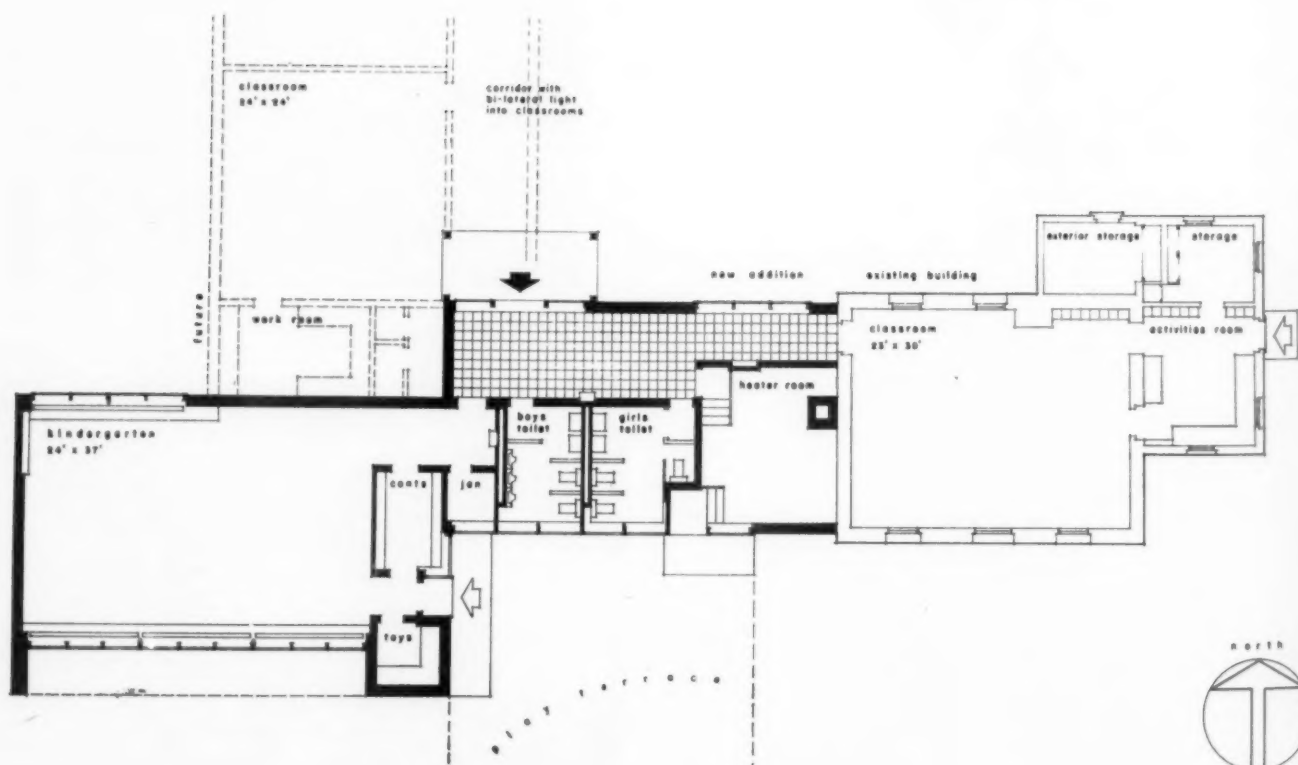
Below, interior of north classroom showing windows and greenboard.







South elevation of Wing Lake School, Bloomfield Hills, Michigan. Floor plan below.



group needs as the workshop proceeded. Emphasis was on the probable nature of education in the future and the kind of school plant needed to fit present and future programs. To make sure that the conference met everyone's need, each registrant turned in a check list of problems of most concern to him. Group discussions were arranged based on most frequently mentioned problems. The self-contained classroom, the core curriculum, the planning of elementary school buildings, and the planning of secondary school buildings, and other topics were discussed. Outstanding feature was group consciousness of the importance of the educational program in planning a school building.

It is the purpose of the School Plant section of the Department of Public Instruction to operate so that those planning school buildings in this state will look to it as a source of help rather than as an agency to be appeased in order to secure approval for plans. Not that this effort is always successful. Too often architects and others instead of explaining why something has to be done in the design of a building, simply say that the state requires it. But we believe a

constructive cooperative relationship exists between school planners and our office.

There are, however, weaknesses and inadequacies which all too often result in poor planning and prevent present school construction from having the high quality it might. Some of these follow.

#### School District Organization

Michigan, like many other states, still has a school district organization system designed for educational, economic, and social conditions of 100 years ago. As this is written there are approximately 4,950 school districts in the state. Most of these districts are "primary" school districts set up years ago to operate an eight-grade program of education in a one-room school. Children go from these small districts to village and city high schools on a state-subsidized tuition basis. About 1,000 of them have voted to close their schools entirely and to send all children to the village school. They maintain their identity as districts, however, for the state aid act makes it possible for them to do this at equal or less cost than to operate their own schools. They pay no part of the capital



Kindergarten in Wing Lake School. Note built-in cabinet space under window sills.



Classrooms in the Long School, Dearborn, Michigan, are bilaterally lighted with glass block windows supplemented by overhead fluorescent lights. Drinking fountain and work sink appear in rear of room. Room toilets are also provided. A reading corner is at the far right. Blonde furniture, pastel walls, green tackboard-chalkboard sections, and light floors lend the room color and sparkle.

outlay or debt service cost of the receiving district.

Such a school district organization blocks improved education. It fosters inequality of ability to support education and leads to expensive duplication of plant and poor buildings.

Many suburban districts now swarm with children. Boundaries in these districts are the same as they were when the district operated a one-room school. Although the city population has moved into these districts, city boundaries and school district boundaries have remained static. Assessed valuation per child is very low because property is primarily residential, sometimes of very low cost. In many cases when there is no administrative staff to plan the needed building, the program usually consists of hiring an architect and instructing him to get as many rooms as he can for a certain sum of money. Buildings then have minimum-

size classrooms, stripped of almost everything that makes a building inviting and useful.

The superintendent in a small district is usually a part-time teacher with little or no training in administration and with no time to exercise real leadership in cooperative planning. The school board thinks of him as a head teacher and not as a professional leader. He is, then, often by-passed as far as the new building is concerned and there is little or no educational planning of the building. Since the architect has not been given any educational specifications, he must plan the building himself. Usefulness of the building depends upon the architect's knowledge and ideas about what a school building should be.

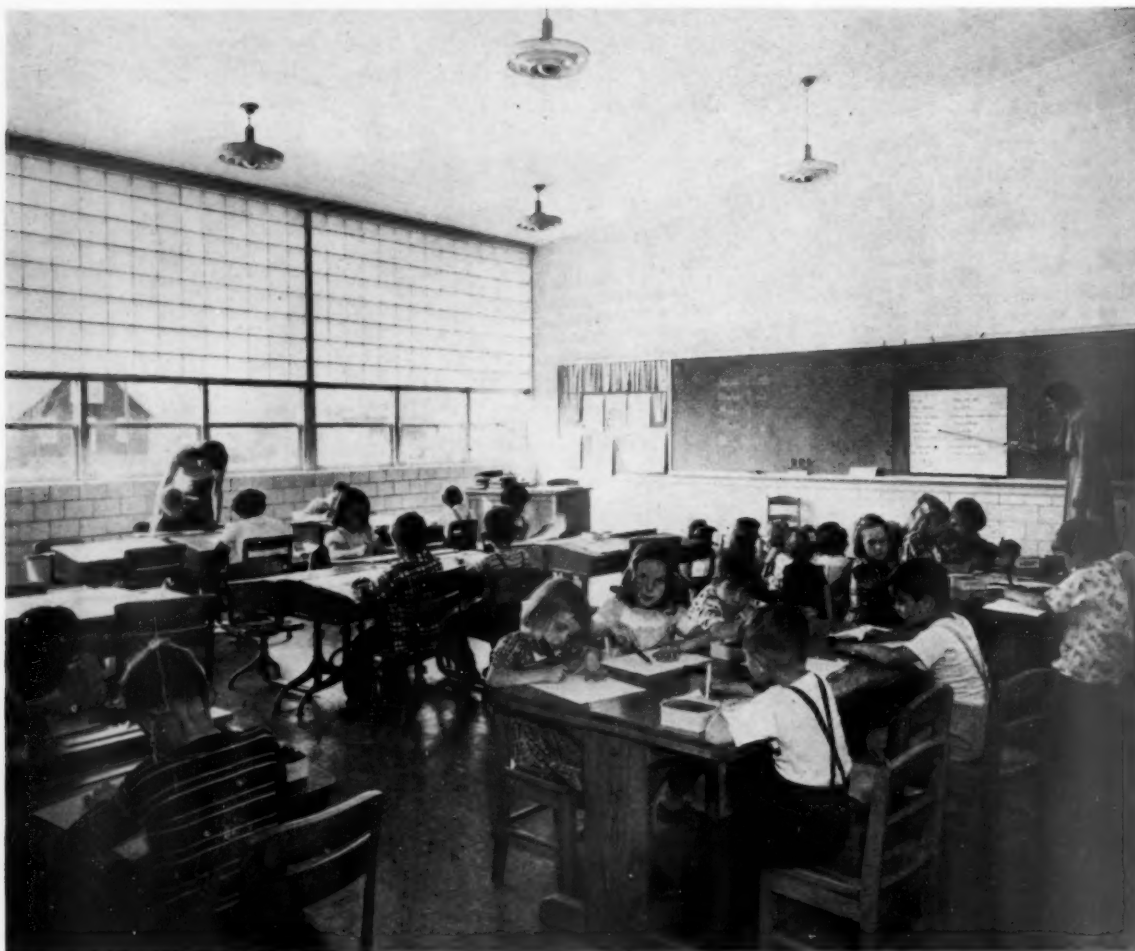
If we really mean business about education and want to spend money wisely and well for buildings, we must do something of more than a stop-gap nature



A hydraulic lift stage rises from floor in the Activities Room. Room also doubles as lunchroom. Note opening on left for dirty dish return.



A junior primary class uses reversible tackboard-chalkboard-art easel sections for art work. Sink is close at hand.



An Interior view of the Comstock School, Comstock, Michigan.

to our outmoded school district system. Recent legislation provides for area studies of education and school district organization on a county or larger basis by lay people. This has some promise of better organization.

#### Question of Money

Although relaxing the fifteen mill amendment did open the door to financing more buildings in Michigan, the problem is far from solved. Some districts, if they bonded themselves to their legal bonding limit, would still be far short of enough funds to build all that is needed as it should be built. The small district may need to replace 100 per cent of its total school plant at one time with only a low tax valuation per child to do it. Larger districts may have to replace only one to five per cent of their plants at one time. Industrial wealth often makes their ability relatively higher. Other large districts, such as cities, can keep up with their needs by an extra tax of two or three mills per year.

Extra taxes on real property bears practically all building costs in Michigan. Parts of the state aid moneys theoretically can be so used. Actually, all

state aid is needed for operation. There is no special aid fund for school buildings. Whether there should be is debatable. The vast majority of the building financing problems certainly could be solved by proper school district organization. Such organization is not here, however, and the children are.

If there is in the future some system of state or federal aid for buildings, it should require sound organization. It also should be designed to supply most aid for the greatest need. Some previous matching programs have done just the opposite.

#### Lack of State Staff

The present staff of the school building section in the State Department might be adequate if Michigan school districts were all large enough so that each district had a trained professional administrator with a capable staff. It might be adequate if the school building program proceeded in orderly fashion with about the same volume of construction each year. But with the present volume of building and the tremendous accompanying need for consultant services during the planning process, the present staff is hardly

able to scratch the surface. Michigan at that is in better shape than some states where no similar school building service exists.

It is appalling to think of the billions of dollars which must be spent on school buildings in this country in the next few years and then to realize the inadequacy of state service in this field. Assuming that these services, if provided, would be reasonably competent, it is evident that a state expenditure of a relatively few thousands of dollars ought to save millions as a result of better planning. State staffs, no matter how adequate, cannot and should not take away local responsibility for planning. The state office must not be a substitute for local planning. It must operate so that it strengthens local initiative and local responsibility.

#### Lack of Planning

Poor school district organization, inadequate financing, and lack of consultant services contribute to a weakness in planning or an entire absence of planning. Boards of education and sometimes superintendents too often appear to think of school building planning

as something mechanical, something which consists of getting answers about what others are doing and what is the "latest thing." They feel that by hiring a capable architect and turning everything over to him they can get the building they need. In some cases they even charge the architect with making a plant survey to determine need. Some architects do not discourage this kind of thinking. Architects deserve credit, however, because most of them sincerely try to obtain from school authorities as much information as possible regarding program needs. Certainly the architect has his important proper function, but he is not an educator, a school administrator, a curriculum expert, or an educational designer and should not be asked to perform their functions. It is the architect's job to understand the local program and needs from experiences and information made available to him and to use all his creative ability to translate the needs and the program into building design.

Board members in too many districts lack any concept of what a good building is or its importance in the educational program. These are usually small dis-

Comstock pupils work on blonde wood desks.





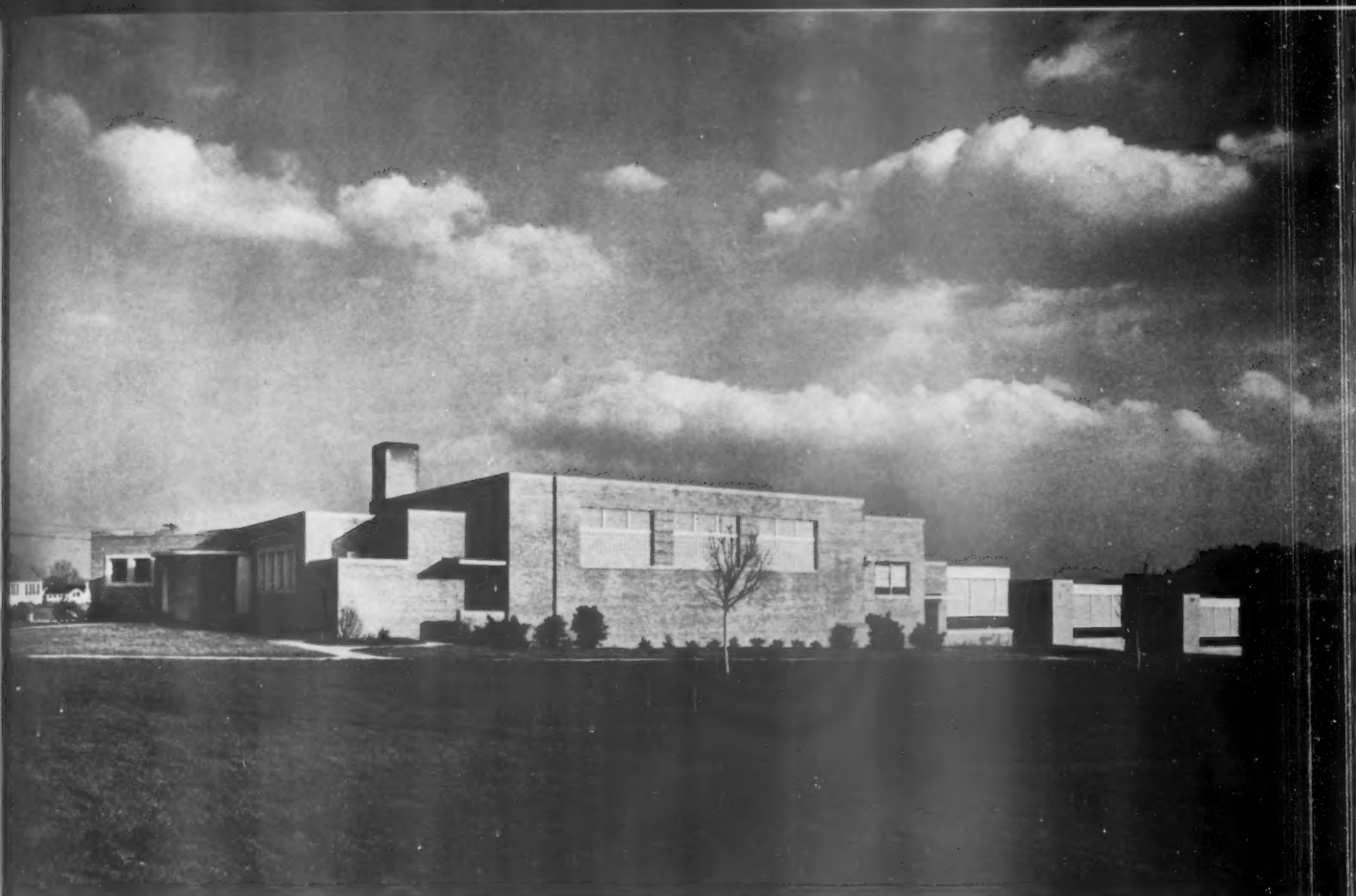


A typical classroom interior in the Arno School, Allen Park, Michigan.

tricts without a superintendent. Their principal concern seems to be to get space cheaply. The board is inclined to resent a state law which requires the services of an architect or an engineer for buildings costing \$15,000 or more. The architect, when hired by such boards, is usually someone who knows little or nothing about schools but who has agreed to work for a lesser fee than is charged by more ethical architects, has shown them a pretty drawing, and has told them that he can build them a building cheaper than anyone else. Unbusinesslike procedures are usually

used in such cases in advertising for bids and awarding the contract for such a building. The result is bad buildings and a waste of public funds.

School buildings are important. They not only house children and so affect their health and safety, but they also by their very nature teach children. We believe that we are getting better buildings in spite of weaknesses and handicaps. We believe there is increasingly effective local planning. There is a tremendous job ahead in this field. If we only had the energy, the vision, and the ability to do it better!



Directional glass block walls provide glareless light and also add beauty to the design of the new Fountaindale School.

## TOGETHER—WE BUILT A SCHOOL

By WILLIAM M. BRISH

Superintendent of Schools, Washington County, Maryland

**W** E KIDS think it's tops," declared Carl Julian summing up his impressions of the new Fountaindale School in Hagerstown, Maryland. The occasion was the formal dedication of the new building and Carl had been selected by his classmates to represent them on a program emphasizing the way the building had been planned and built.

A proud community gathered for the exercises. Pupils were there, parents and friends, teachers, school officials, county commissioners, the architect, the contractor, workers—all were there. Some shared in planning, financing and constructing the building. Others represented school and community groups that would use the building.

"The beginning of our children's education has been made so rich through the creation of this school en-



Mr. Brish, who received his A.B. degree at Franklin and Marshall College and his M.A. at Teachers College, Columbia, is working for his doctorate at George Washington University. After being Principal of the Elm Street School in Frederick, Maryland, he became Assistant Superintendent of Schools in Prince George's County, Maryland, and then Superintendent of Schools in Kent County. At present he is Superintendent of Schools in Washington County.

vironment that we as parents should do everything in our power to further their education," said the parent of a kindergarten child. And we remembered that Nicholas Engelhardt, our consultant, had told us, "The first school that a child attends is most important to the future growth and development of the boy or girl. The school should be designed to be



Plot plan for Fountaindale School shows provisions made for parking, play areas, and the special park and picnic grounds.

attractive and friendly to young children; the school-house itself is an instrument of education."

"This great new building is the framework of that environment which teachers and pupils themselves create," said a parent who added, "We parents expect to have a part in the school . . . we must help the school function so that we can build a better community. We want to help integrate home life and school life as much as possible for our children." As a Parent-Teachers Association we pledge ourselves to work worthily that all our hopes for this grand new school shall be realized."

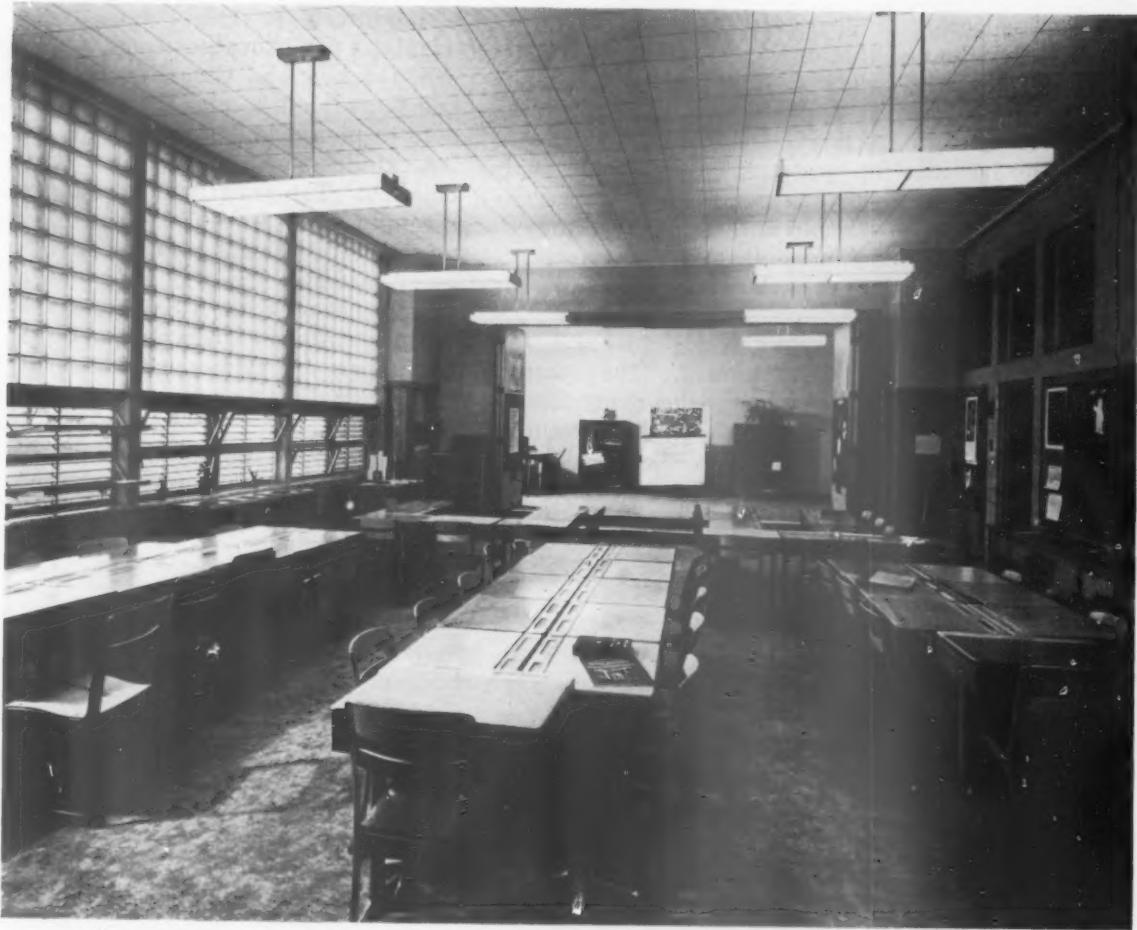
#### New Broom Welcomed

The principal, Miss Margaret White, explained that the educational program of the school was being

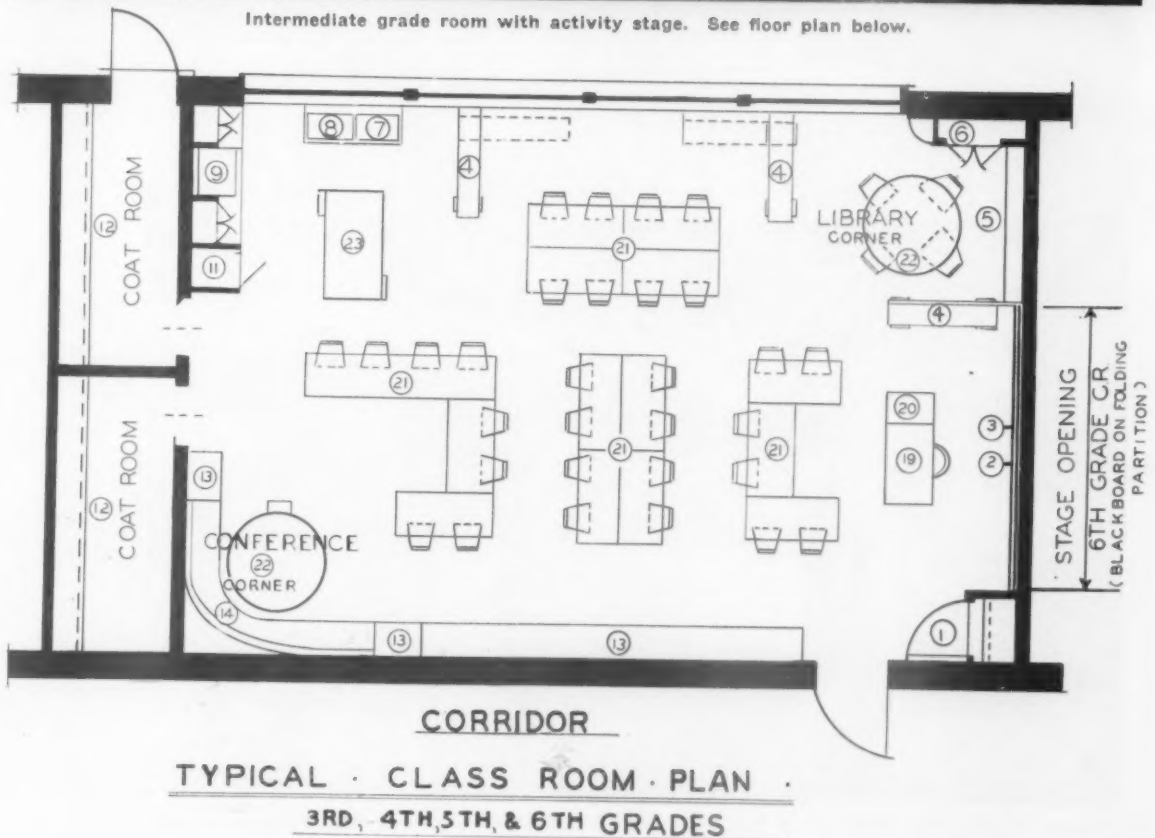
planned by teachers and pupils to take advantage of the new environment and the modern school equipment. "Convenient and labor saving devices," she said, "enable the user to have more time and energy for other tasks. Teachers with modern equipment at hand, with adequate floor space and facilities for storage have opportunities for many kinds of activities that meet the particular needs of the children. What a challenge to the teacher!"

I. Keller Shank, chairman of the county commissioners and a veteran of 50 years in educational work, recalled the day when a school was built on any rocky eighth of an acre that was worthless for any other purpose. He promised the financial backing from the county commissioners for building all future schools as fine as Fountaindale.





Intermediate grade room with activity stage. See floor plan below.



The president of the Board of Education, Phillip A. Rauth, pointed out that most spaces in the new school had been designed carefully to provide appropriate adaptations for adult use without interfering with the regular school program. He urged the community to use the facilities for meetings, forums, hobby and craft work, social events and recreation. He asked for suggestions from parents and community groups in order that "we can build an even better school when we construct the next one."

#### All Had a Hand in It

The architect, Rhees Burket, said, "The success of any school building project depends on many things and many people. First, the school board and county commissioners, those responsible for the acquisition of this beautiful site, are to be congratulated. It is adequate for present and expected needs, prominently

and centrally located, and easily and inexpensively adaptable for educational and community use. Second, the board of education and the superintendent had the wisdom to give their architect complete freedom to plan a building to fit the site, and to design the exterior to fit the plan and the function of the building. The entire design and arrangements were carefully studied with the aim of creating the best possible environment for child growth. In this school every material that was used, every finish that was applied not only has a bearing on original and maintenance costs, but contributes to the all important atmosphere or environment for child growth."

In concluding the program, County Superintendent William M. Brish reminded the group that the best way to prevent the building from becoming obsolete was to continue the processes of cooperative action that had made the building possible. He asked par-



Spacious kindergarten measures 24 feet by 43 feet and contains workroom with sink, cloak room, storage cupboard and lavatory.

ents and friends to keep up their interest in the school and to assist in the continuous work of planning the program of education. The building was planned to permit changes. "Together we shall make these changes to meet the changing needs as we develop better ways of providing wholesome educational experiences for our children."

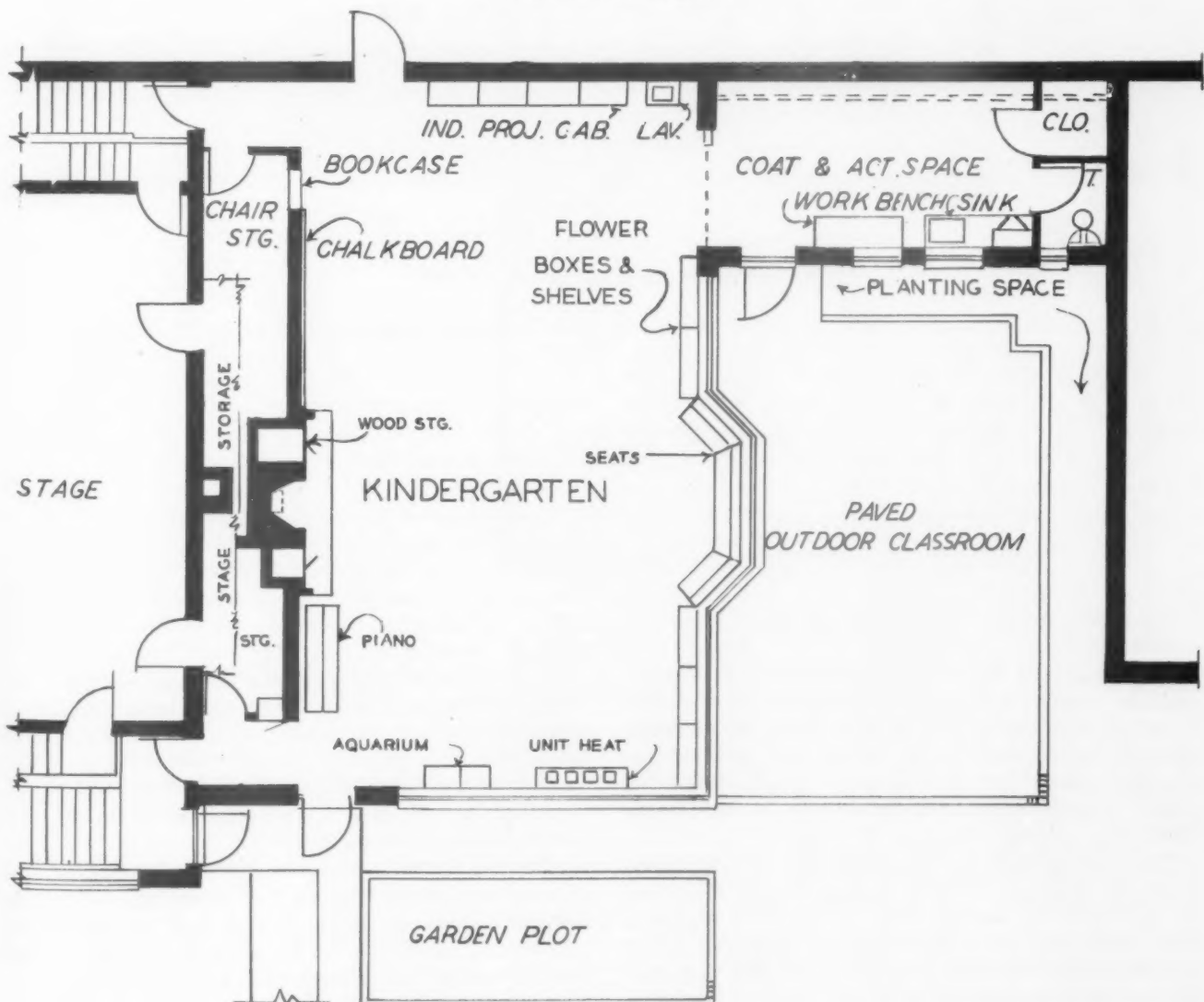
Fountaindale School is not a unique structure, superior to anything of its kind in our country. While not radically different from many good schools under construction in other parts of the United States, it is radically different from the other schools in our country. It is the result of careful planning by the board of education, with county school officials, teachers, parents and pupils, and by the architect and consultant. It is interesting because it represents what can be done by any group that wishes to become acquainted with the resources now available for plan-

ning and constructing a new school. The members of the board of education did not invent these ideas, but they studied, listened, collected, summarized, evaluated, accepted, and adapted ideas to the local situation. This process is available to all.

#### How to Start

Invaluable information can be secured through books, magazine articles and printed standards, from experienced school architects and consultants and from visits to construction sites of other buildings. A school is more than a building—it is the embodiment of a plan for providing proper facilities and environment to carry out an educational program designed to fit the needs of particular groups of pupils in a particular community on a specific site. This definition means that buildings cannot be copied if they are to meet local needs.

Floor plan for kindergarten.







Floor plan for primary classroom.

The Board of Education of Washington County and the county staff tackled the problem of better school facilities as an interesting challenge to create an environment which was capable of meeting the changing needs and procedures of teaching and yet would provide a stimulating setting for developing child life.

The members of the board felt that in developing a master program for school construction an expert in this field for consultation should be brought in. Dr. Engelhardt, one of the nation's outstanding experts on school construction, was selected. He met with the board on numerous occasions. Later in working

with community and parent groups he helped direct their thinking to the importance of the building as a stage setting that could limit or enrich the educational program. He raised questions about what a school building should contain and furnished written recommendations that helped the board decide on ideas to be included in the building.

Dr. Engelhardt was especially interested in helping the committees develop an understanding of the basic considerations involved in planning an elementary school. He said: "With increased knowledge of how children grow and develop has come increased realization of the significance of the early years of education



Outside venetian blinds eliminate use of venetian blinds or shades inside.

in defining the personality of the embryo citizen and in providing a proper start in education upon which future years of schooling can be built.

"The school for the young child is one in which he learns, has a wide variety of experience, develops and grows in fundamental ways. That together with his home life determines to a surprisingly large degree what kind of person he will be like in later life. The educational program for young children is not simple. The teacher in the kindergarten is not just playing with five-year-olds. She is carrying on a complex, difficult intellectual task in a highly skilled professional area. To design a successful school building for young children the architect must have keen insight into what will happen in all the learning spaces of the school."

As the discussions proceeded it became evident that the planning of a school building is an educational enterprise. If school and community groups do not work together in sharing ideas and coming to agreements, the people of the community are denied an experience that is a highly educational and desirable part of adult democratic living. A school that is built through such cooperative action is a source of community pride, and likely to fit community needs. Parents understand the instructional program because they

have shared in the discussions and learned professional training and experience about children and attitudes toward them. Teachers also benefit from the layman's point of view about children. Children benefit from this partnership of school and home especially during the early years of schooling.

This summary was the background behind the board's thinking as they approached the problem of constructing Fountaindale School, a new structure for a rapidly expanding suburban community. Here was the opportunity to take advantage of what was known about buildings and create a school to meet pupil and adult needs and set an up-to-date standard of school construction in the county.

#### Build It Here

Site was under consideration first. Based on a list of standards the board had developed, a decision was made to use a prominent plot of ground outside Hagerstown city limits. It was in the center of the northwest building development, visible to passers-by, and a lovely site of rolling country. An abandoned one-room school stood on a small section of it.

The board next appointed an architect, after taking the recommendation of experts and being careful to study projects and visit buildings designed by appli-



View of multi-purpose room from stage. Tables and benches (shown open) fold into the wall.

cants. Rhees Burket of Washington, D. C., was chosen. He had specialized in school planning for years and had designed Kensington Junior High School in Montgomery County, one of the first functionally designed schools in Maryland.

A list of specifications was prepared by the board with the help of the consultant and staff officers who in turn worked with principal, teachers, parents and pupils. The architect was asked to incorporate these specifications into a building. He was given a free hand and asked to present in the initial proposal his conception of the best arrangement of the following general specifications:

1. Plan a complete building of several units for 500 or more elementary pupils eventually; the first unit to accommodate approximately 225 pupils. Plan this unit in detail but show how future additions would be arranged when added.

2. Plan the grounds around the first unit as a complete setting with paved and grass play areas, roads, parking space, walks, curbs, landscaping, seeding and

sodding. Show possible areas to be developed later.

3. In the first unit provide 6 classrooms, a kindergarten, a multiple purpose room for assembly, indoor play and lunch program, an office, a small library, and a health clinic. Provide for future enlarged facilities for office, library, clinic, and teachers' rooms.

4. Design the building so it will have a pleasing exterior appearance of a permanent character in which both the students and the community will have pride. It need not be monumental or traditional design. If the site permits, the school should be a one-story structure with an outside entrance for each classroom.

5. Construct the building of good durable materials that will provide a safe, sanitary and easily maintained environment.

6. Make classroom units large enough to have plenty of free floor space, plenty of storage facilities and open shelves. Provide flexibility when placing fixtures and equipment.

7. Plan for multiple use of equipment, especially service equipment.





View of multi-purpose room showing folding dining tables and benches in wall recesses.

8. Plan the building for community use as well as pupil use.

9. Plan facilities for using movable furniture.

10. Use light colors throughout with no excessive contrasts.

11. Provide for running water in each classroom, storage and work areas with sink and kitchen cabinet type of storage. Provide for growing plants and living things.

12. Include appropriate chalkboard space, bulletin boards and simple storage of pupils' coats, hats and overshoes.

13. Suggest additional ideas that you have found successful.

14. Make the total plan fit into the community's financial means. If possible the first unit should not exceed \$300,000.

When the preliminary drawings were presented, we were pleased with the original way the architect had used our ideas and many additional ideas and suggestions of his own. The building not only fitted our

needs and specifications, but blended into the site so that it seemed to be part of the surroundings.

While the architect worked on more detailed sketches and drawings we continued our study of population trends and probable enrollment. With the help of our consultant we wrote material later developed into the preliminary edition of a booklet entitled *Planning the School Environment* for distribution to the teaching staff and the community. We were thus better able to participate in the meetings which led to the approval of the final plans and specifications.

The design of the building has been favorably received. It is built on several levels and flows along with the topography of the land. Some distinctive features are:

A diffusing and directional glass block wall above a strip of clear glass sash for vision and ventilation gives an abundance of glareless light at all times. Outside venetian blinds or jalousies are used over the clear glass vision strips and eliminate the use of shades or inside venetian blinds which are a constant source

of annoyance and require constant maintenance.

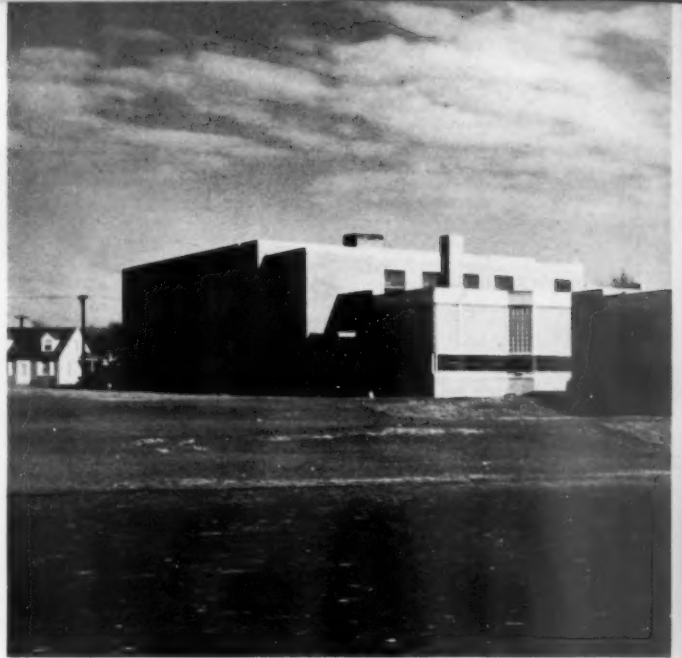
Fluorescent lighting is used throughout. Photo-electric cells control the inner row of lights in the classroom so that if adverse weather conditions indicate the need for supplementary lighting, it will be automatically provided.

Corridors and classroom walls have glazed tile wainscots for easy maintenance.

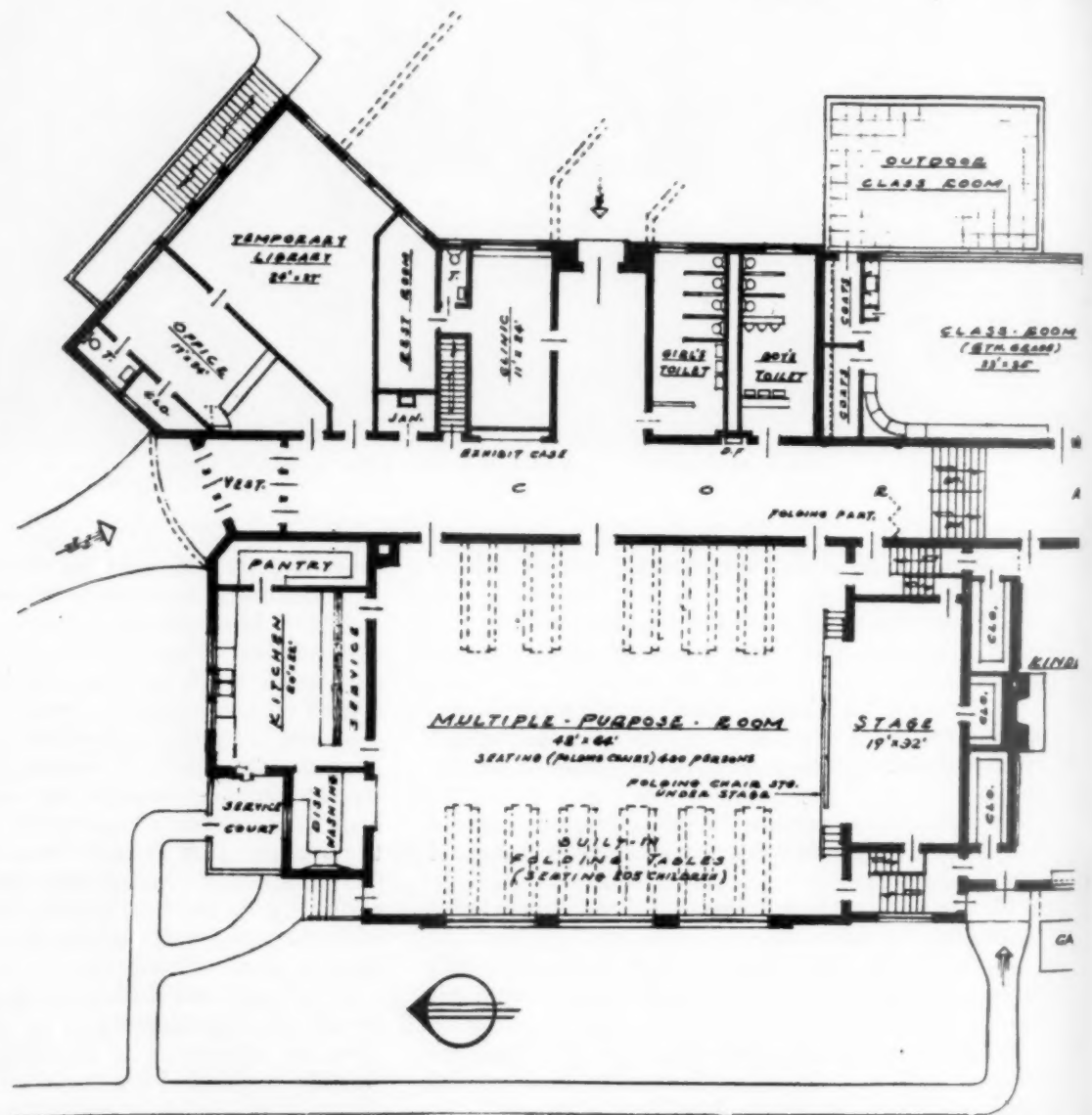
Draw curtains are installed in each classroom and the multi-purpose room so that audio-visual education aids may be effectively used.

All floors are light colored. They are terrazzo in the corridors, linoleum in the classrooms, asphalt tile in the multi-purpose room and ceramic tile in the lavatories.

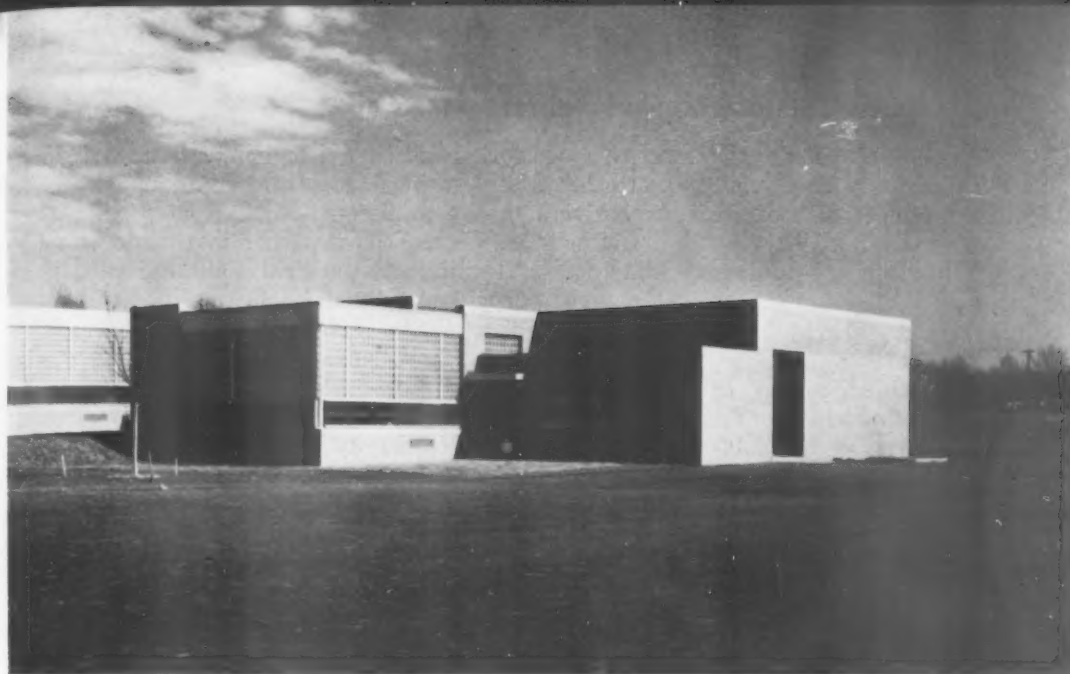
Tables and benches fold into the wall of the multi-



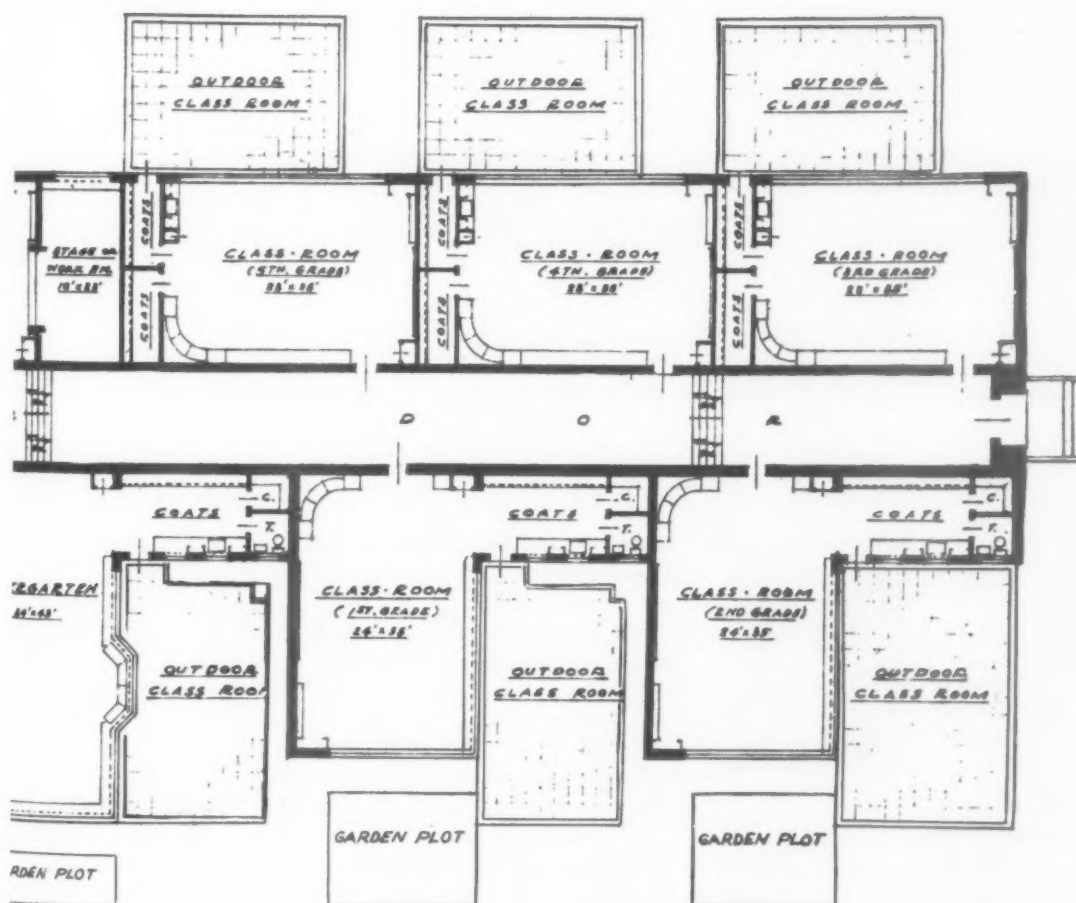
Built on several levels, the New



Floor plan of new Fountaindale



Fountaindale School flows along with the topography of the land.



School in Hagerstown, Maryland.



purpose room and chair storage is provided under the stage. There is a compact cafeteria kitchen unit. Heating pipes are installed in the cement floor of the shielded outdoor kitchen court.

Each classroom has its own brick-paved outdoor classroom and brick-edged garden plot.

A large outdoor paved play area is provided and a paved parking area is near the entrance.

Typical classrooms are arranged with a conference corner, a library corner, bookcases, cabinet for storage of large paper, individual student project storage cubicles, teacher's storage and coat closet, kitchen type cabinet and sink with drinking fountain.

The kindergarten, 24 feet by 43 feet, has a 12-foot by 20-foot workroom with sink, cloakroom, storage cupboard and lavatory. This workroom is separated from the classroom by accordion-pleat folding doors.

Primary rooms, 24 feet by 35 feet, have workrooms similar to kindergarten.

Intermediate rooms are 23 feet by 35 feet. All classrooms have doors opening on the paved outdoor classroom area.

Classrooms are painted a light blue-green on the west side and light yellow-green on the east.

Glass chalkboards are green, tackboards light tan.

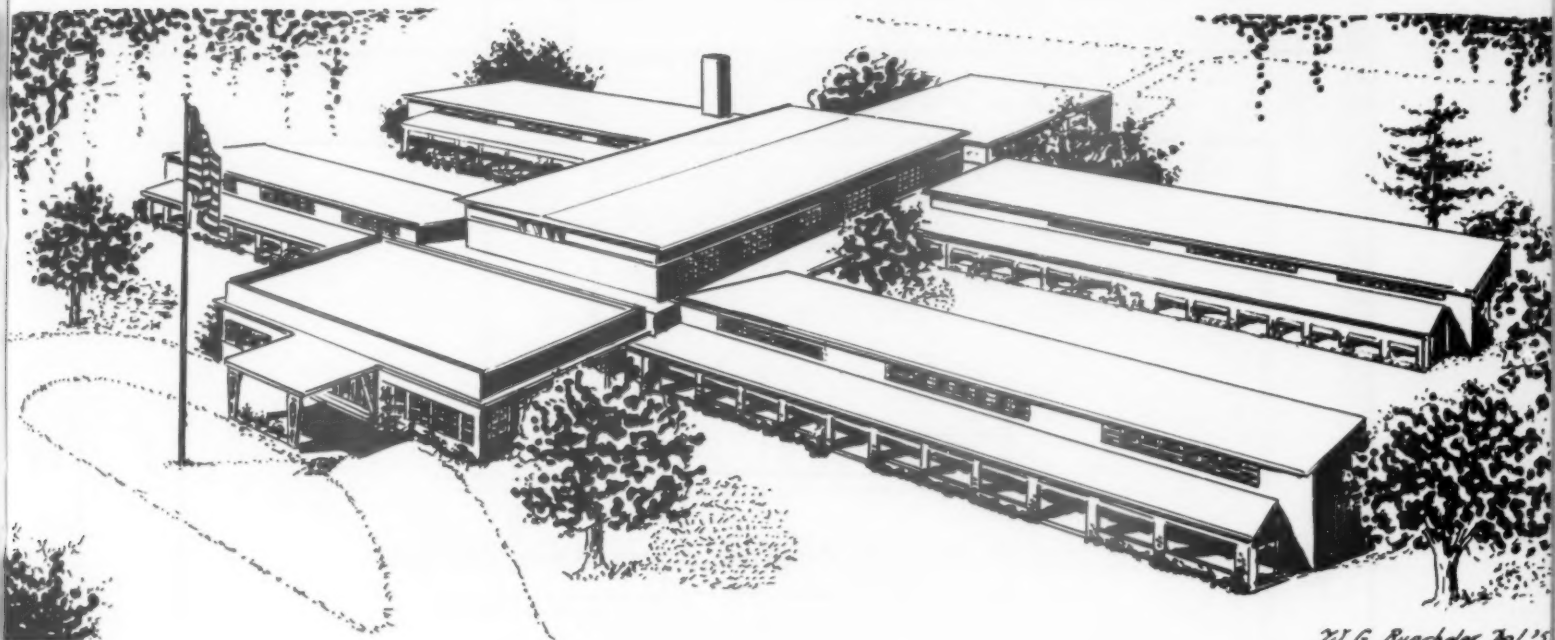
All woodwork is birch finished in a natural light varnish. Metal frames are enameled to match the cream ceramic tile wainscots.

Ceilings are white acoustical tile in corridors and classrooms. Insulating acoustical slabs are used in the multi-purpose room and kitchen.

Contract price of the building, landscaping, roads, parking and play hard surface areas and walks was \$289,000.

We are proud of our building. It has already acted as a stimulant to community improvement. The community is proud of it. The school is a spot of beauty in surroundings that are daily becoming more beautiful. The program in the school reflects the problems of the community and the community is a better place because of the school. The pupils are still excited over it. They meant what they said: "We think it's tops." The local newspaper caught the spirit when it wrote:

"The 1950 version of the little red schoolhouse—new and modern Fountaindale School—got itself dedicated yesterday and parents and students who attended were reminded that this is the kind of building that can be built when a community works together to build a school."



Duval County, Florida, moves ahead—the Lake Forest Elementary School.

## A NEW SCHOOL BUILDING PROGRAM IN DUVAL COUNTY, FLORIDA

By WILLIAM G. BUECHELER

Technical Supervisor, Duval County Board of Public Instruction, Jacksonville, Florida

**T**HROUGH the untiring efforts of our superintendent of public instruction, W. Daniel Boyd, backed by a progressive board of public instruction, Duval County, Florida, is on its way to adding about \$14 million worth of schools to its presently inadequate plant.

### Functional Approach

Francis R. Scherer, architect and superintendent of school buildings in Rochester, New York, was employed to make a survey of the needs of this community. Based on Mr. Scherer's recommendations, the new schools should be adequate and modern in every respect. Advisory councils made up of supervisors, principals, teachers, and citizens' committees are all working together toward this end.

The sketches of Lake Forest Elementary School No. 74 serve as an example of what is to come. A group of three architects combined to plan this school:

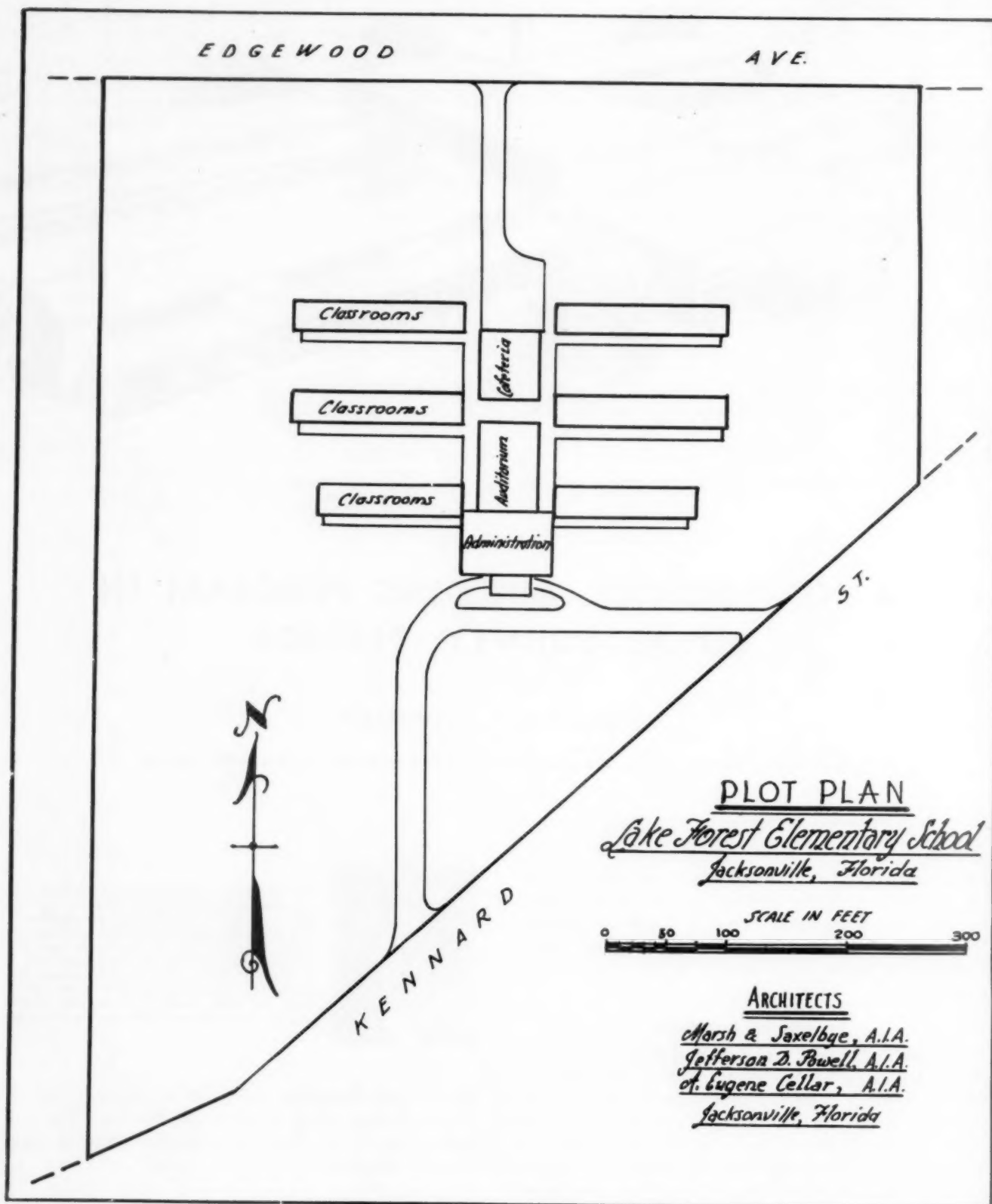


Mr. William G. Buecheler of Jacksonville, Florida, was educated at Temple University and the University of Pennsylvania. He is a registered professional engineer with 35 years of architectural and engineering experience to his credit. He is a colonel in the Corps of Engineer Reserve, taking an active part in its activities. He is the Technical Supervisor of Duval County's Board of Public Instruction.

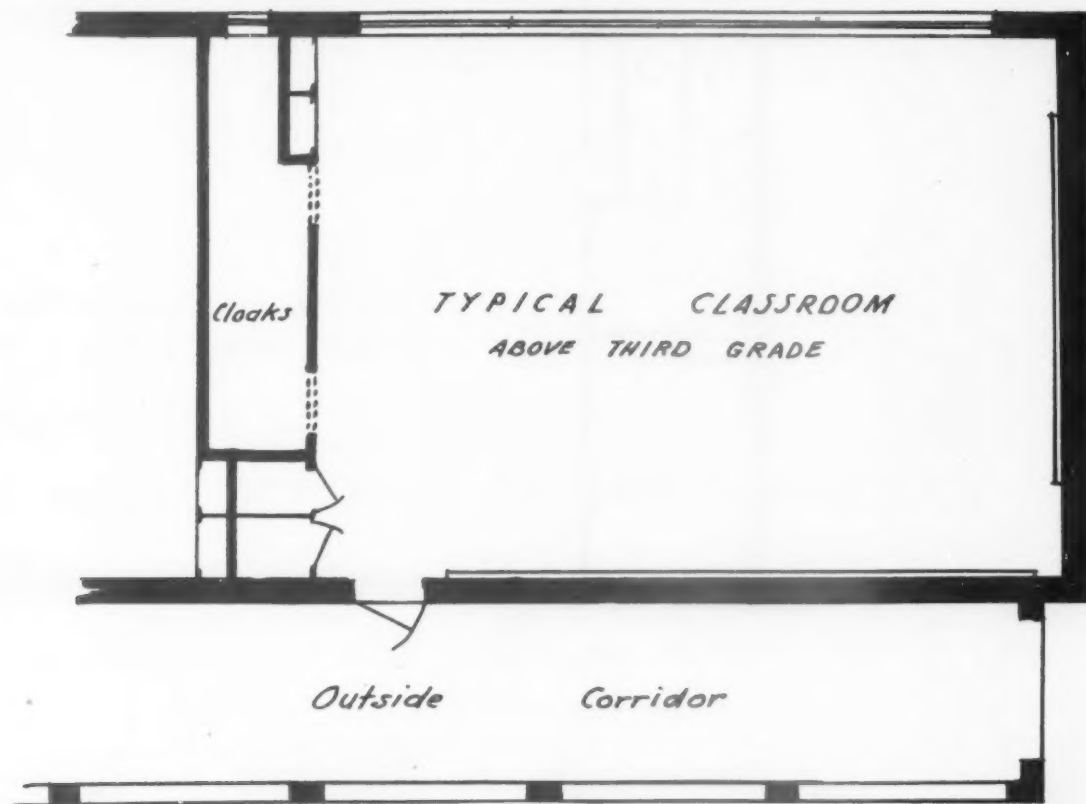
Marsh and Saxelbye, Jefferson D. Powell, and A. Eugene Cellar, all of Jacksonville, Florida. The contractor was O. P. Woodcock Company, also of Jacksonville, Florida.

### Modernization Achieved

This school is a one-story structure with outside corridors. Note particularly the cross ventilation achieved by the clerestory windows. Note also the



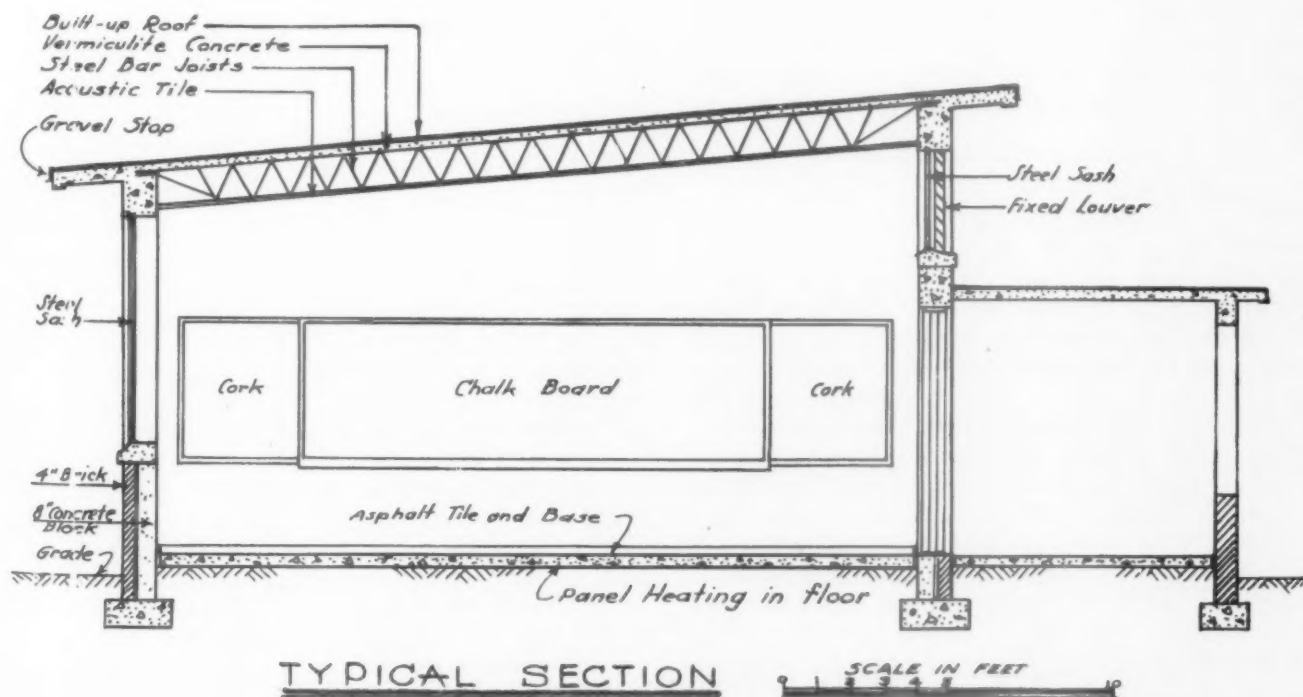


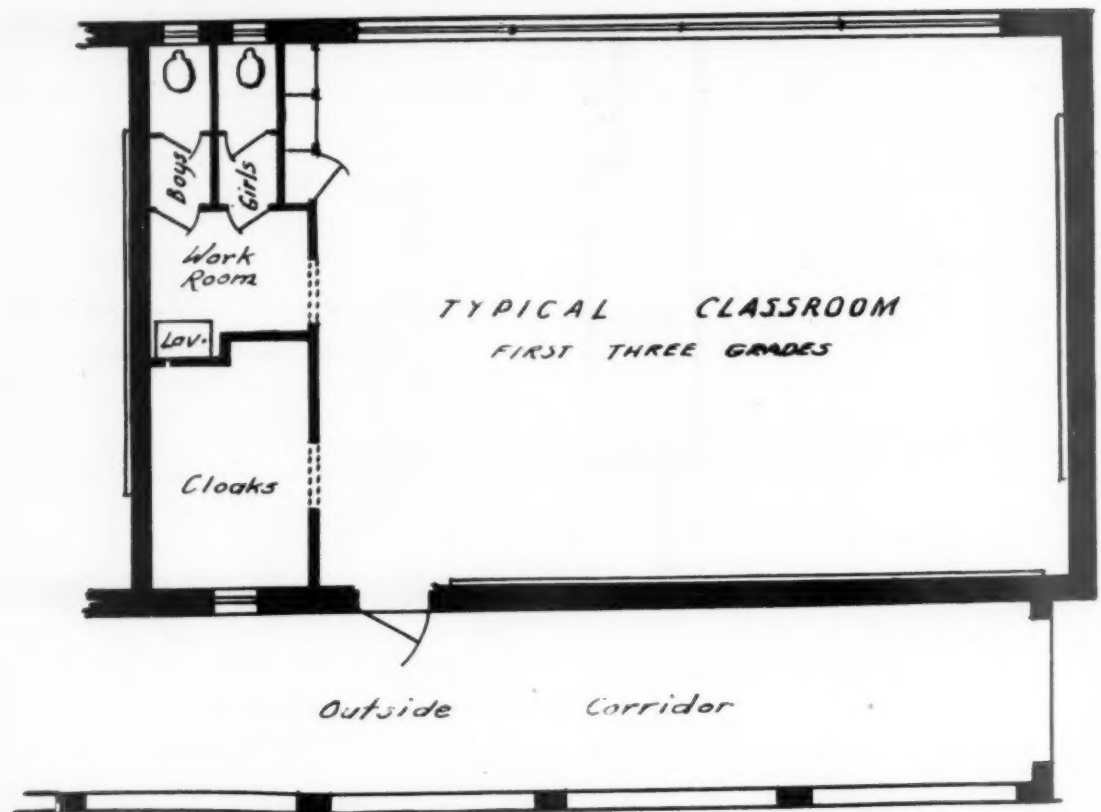


complete facilities for the first three grades.

This school points out the definite progress achieved toward modernization. It also indicates that Duval

County will move forward in line with the general trend throughout our nation to build better houses of learning for our future citizens.





Classrooms for the first three grades have complete facilities. Lake Forest School is a one-story structure with outside corridors. Cross ventilation is achieved by means of clerestory.

# THE HOME SCHOOLS OF SAN FRANCISCO

By N. L. ENGELHARDT, Sr.

Educational Consultant, Engelhardt, Engelhardt and Leggett, New York City

A Yale graduate, N. L. Engelhardt followed the career pattern—teacher, principal, superintendent—until the work being done in school administration at Teachers College, Columbia, made him resign his position to attend. There he developed his interest in this field and became a national authority. After five years as Associate Superintendent of New York City schools he resigned to become even more energetically involved in all aspects of school plant planning.



**H**OME SCHOOLS serve best where population density and educational programs will not justify larger elementary school plants. San Francisco is uniquely adapted to the inclusion of home schools because of its irregular terrain. The city occupies a peninsula bounded on three sides by water, and here and there waterfront levels are backed up by high hills which are difficult for young children to traverse. Therefore, the board of education has adopted the policy of erecting a limited number of home schools and has authorized their planning and construction.

## Two Concepts of the Home School

In San Francisco the home school has been thought of in two different ways. First, it may be planned as a separate unit on a limited site to provide for younger children isolated by geographical conditions or living in areas having at this time a preponderance of young children, who at normal birth rate times would attend the nearby complete elementary schools for Grades K-1-6. A second category is as the first unit of what may become a complete elementary school when new residential developments and new population growths occur in the particular area. In the latter cases, the unity of the home school can be pre-

served although the possibility of future extensions has been fully recognized in the planning.

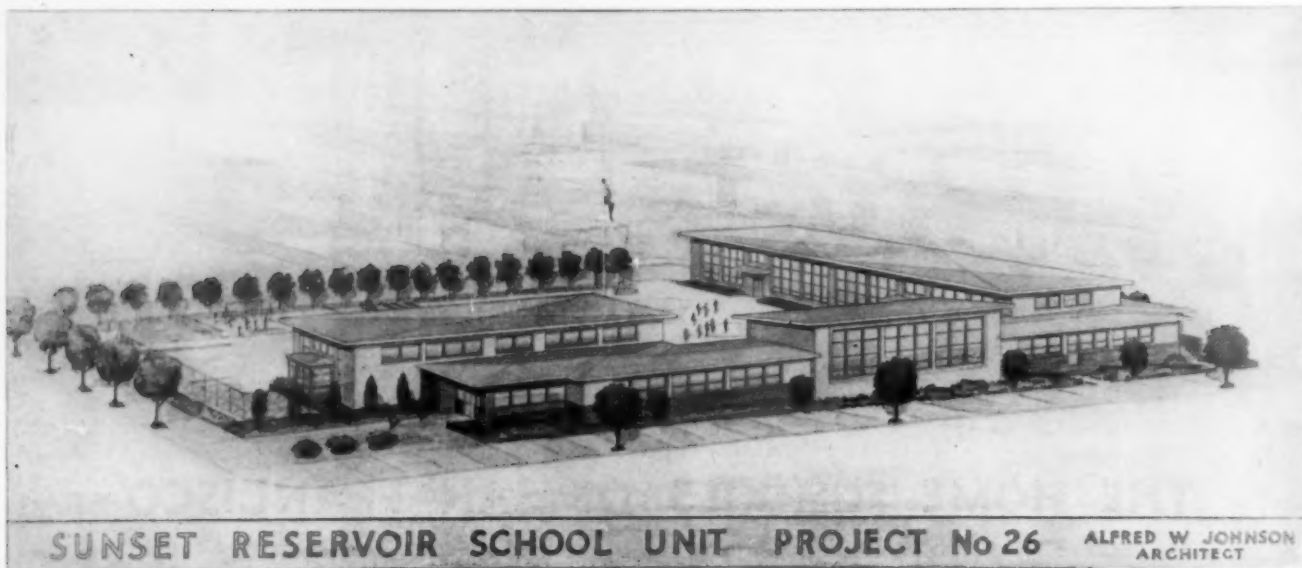
The home school has long been promoted in educational literature because of the advantages offered primary children. One of the basic reasons for its development lies in the possibility of securing integration in the crucial periods of early childhood education. The advantages of uniting home and school more closely, of keeping young children nearer their homes, and of making more considered and complete provision for the entire school program for younger children are also provided. Realistic experiences for physical, social, and emotional growth can be given greater stress when these younger children's interests are not brought in conflict with those of older children.

## No Temporary Substitute

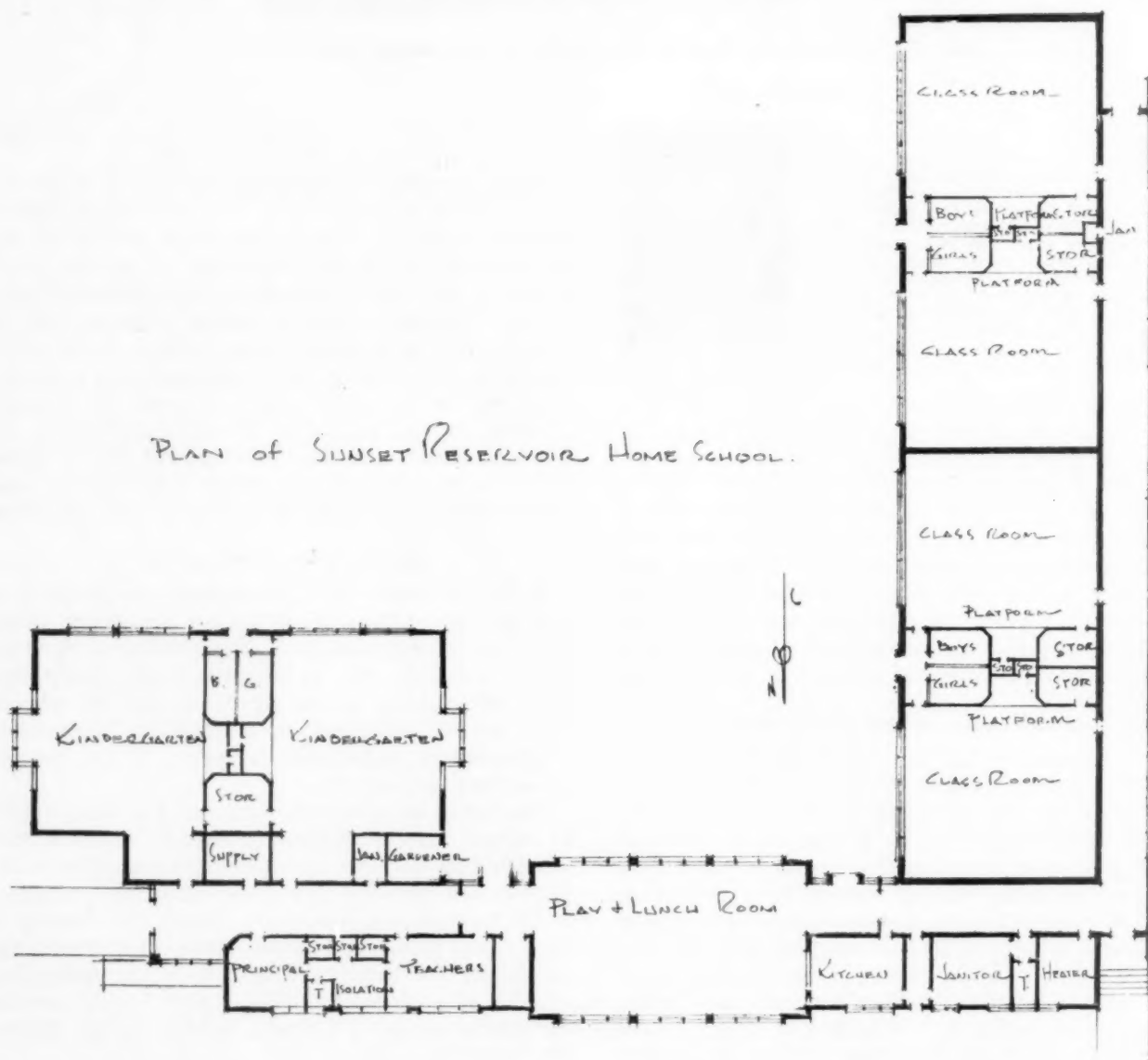
In San Francisco all home schools are planned as one-story structures. They are not temporary buildings but earthquake-proof, fire-resistive structures, able to serve the city as school and community centers, and possibly in the future as nursery schools. They are self-contained units which can be operated independently under administration of the nearest elementary schools.

The home school may be considered a feeder school to several regular elementary schools within a reasonable distance from the children's homes. Its facilities are not intended to replace comparable facilities in the surrounding elementary schools, but merely to supplement them, because these schools too must make provisions for children who live in the immediate vicinity of each school. These units would provide for special needs of younger children in the following ways:





PLAN of SUNSET RESERVOIR HOME SCHOOL.



Physical growth—by providing plenty of indoor and outdoor space for free exercise, and a garden patch for nature study. The children's safety is provided for since their play space is separated from play areas for older children. Each age group has its own play space and equipment.

Social growth—by providing sufficiently large classroom and play space for children to learn to work and play in groups, small and large. Separation of the school unit from the main building releases it from some of the restrictions usually imposed upon larger buildings, and permits the creation of a freer more natural atmosphere and environment.

Emotional development—by creating an atmosphere where mothers will feel free to come to school with their young children, and where they can observe their children at work and play, confer with the teacher, and thus help to effect the transfer of the child's interests from home outward to the world, gradually and satisfactorily.

Experiences—by providing space where "things" may be utilized and learned about, where large play activities and projects can be carried on without disturbance by older pupils, and by setting up an atmosphere which has not yet the routine or formality of the larger school but which provides a happy environment in which little children learn best.

#### Adaptability

This type of building is readily adaptable to other needs. Because of its use by parents of young children and because of its informality, the home school makes an ideal community center. It can accommodate the needs of various small groups such as parent-teacher meetings, lectures, debates, adult education classes, and other such socio-civic activities.

#### The Site

The home school requires less site area than a regular elementary school because the building is small and extensive playgrounds, auditorium, and gymnasiums are not required. Limited kindergarten and primary play yards, plus a small landscaped entrance area constitute all the space needed in addition to that occupied by the building itself.

#### The Grade Group to Be Served

Superintendent H. C. Clish of San Francisco has provided that home schools serve the kindergarten and grades one, two, and three. In some instances grade three is not included.

In addition to classrooms, spaces include an all-purpose room to serve assembly, play and lunch purposes; teachers' restroom and lunchroom; an office with adjoining health provisions; storage facilities for educational and custodial needs; and utility services.

#### No Standardized Structure

The home school, fortunately, has not taken a standardized form in the San Francisco School System.

Different private architects are given commissions to do the planning. Each is given a comprehensive statement of educational specifications which includes the ideas and opinions of the professional staff. The comprehensiveness of these specifications is illustrated in the following excerpt covering kindergarten needs. A similar statement is given covering all other spaces. Architects have made varied adaptations in their plans with full acknowledgment of the problems arising from contours, orientation, and protection against prevailing winds.

#### Educational Specifications of Kindergarten Spaces

Each kindergarten will have an approximate area of 1,000 square feet, in addition to its ancillary spaces: the general teaching area; the personal hygiene area; the storage spaces. In San Francisco the optimum size of a kindergarten class is thirty pupils. The space for these pupils will consist of three major areas or rooms within the building and the outdoor area. Kindergarten spaces are preferably located where they will have southeast and south exposure.

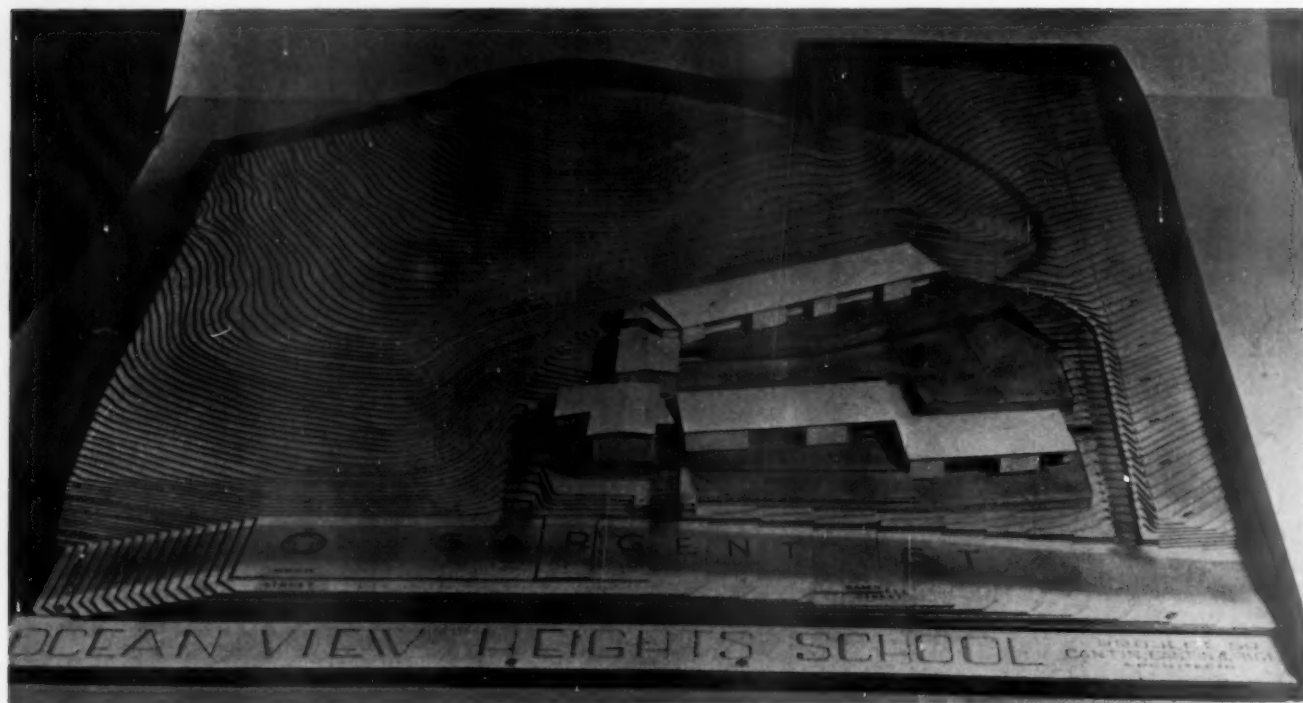
#### The General Teaching Area

The general kindergarten area should be considered in terms of several small areas according to the character of the educational work being done. These areas can be separated partially by movable bookcases, shelving and the like, yet not too easily pushed about. The smaller areas are as follows:

The general work area where tables and chairs are provided for thirty pupils with two pupils per table. These tables are provided with flat tops 20 inches by 40 inches. This general work area serves best when given the place of prominence in the kindergarten room.

A bright playhouse corner (60 to 75 square feet) should be provided, sufficiently large to simulate desirable home conditions. It can be cut off by movable walls standing 3½ feet high. The house should have its own little door and the exterior should appear to be an attractive home. Within the space there will be a crib, a toy stove, a toy tea table and chairs, and other home equipment as the children elect. Provision for plugging in electrical devices is desirable. The kindergarten piano might be moved into this playhouse from time to time to give it more of the characteristics of a home. The playhouse should occupy a well lighted corner with plenty of sunshine.

The library or study area should provide for grouping children for a storytelling period or picture book period and other group social activities. The heart of this area might be a circular library table, 48 inches or larger, around which children can sit. Books should be readily accessible about the table or nearby. Many of the kindergarten books require deep shelving, 10½ inches to 11 inches. Bottom shelves of bookcases are preferably tilted to the wall so that children may see the backs readily. Good natural and artificial lighting is important for this reading area.



The block area should be sufficiently large so that children may build themselves a home, a fire house, a post office, or other community structures of a size which they might enter. Here their activities would simulate the actual activities carried on in the structure which they build. Large blocks which the children use should have nearby provisions for compact storage. This block area should be out of direct traffic lanes so that structures can remain standing without making a barrier in the room.

The art area will be a section in which four, six, or eight children are working simultaneously. There will be three or four easels of appropriate size for kindergarten children, a finger painting table, and a table for working in clay which has a waterproof top and may be 24 inches by 36 inches in size. This equipment should be grouped near a window and near the clean-up area where a sink is provided. If wall space permits, built-up easels may be used but they must be provided at a height appropriate for kindergarten children.

The nature and science area provides equipment where children may participate in planting and in the observation of growing plant and animal life. There will be provision for an aquarium and a terrarium. These must have adequate natural light. There might also be provision for a few animals such as rabbits and squirrels which are observed and fed by the children. Ease for cleaning their receptacles must be planned for. The sand table may be closely related to this area of instruction.

The woodwork area will consist of one workbench of proper height for kindergarten children with storage facilities nearby for unfinished materials and tools.

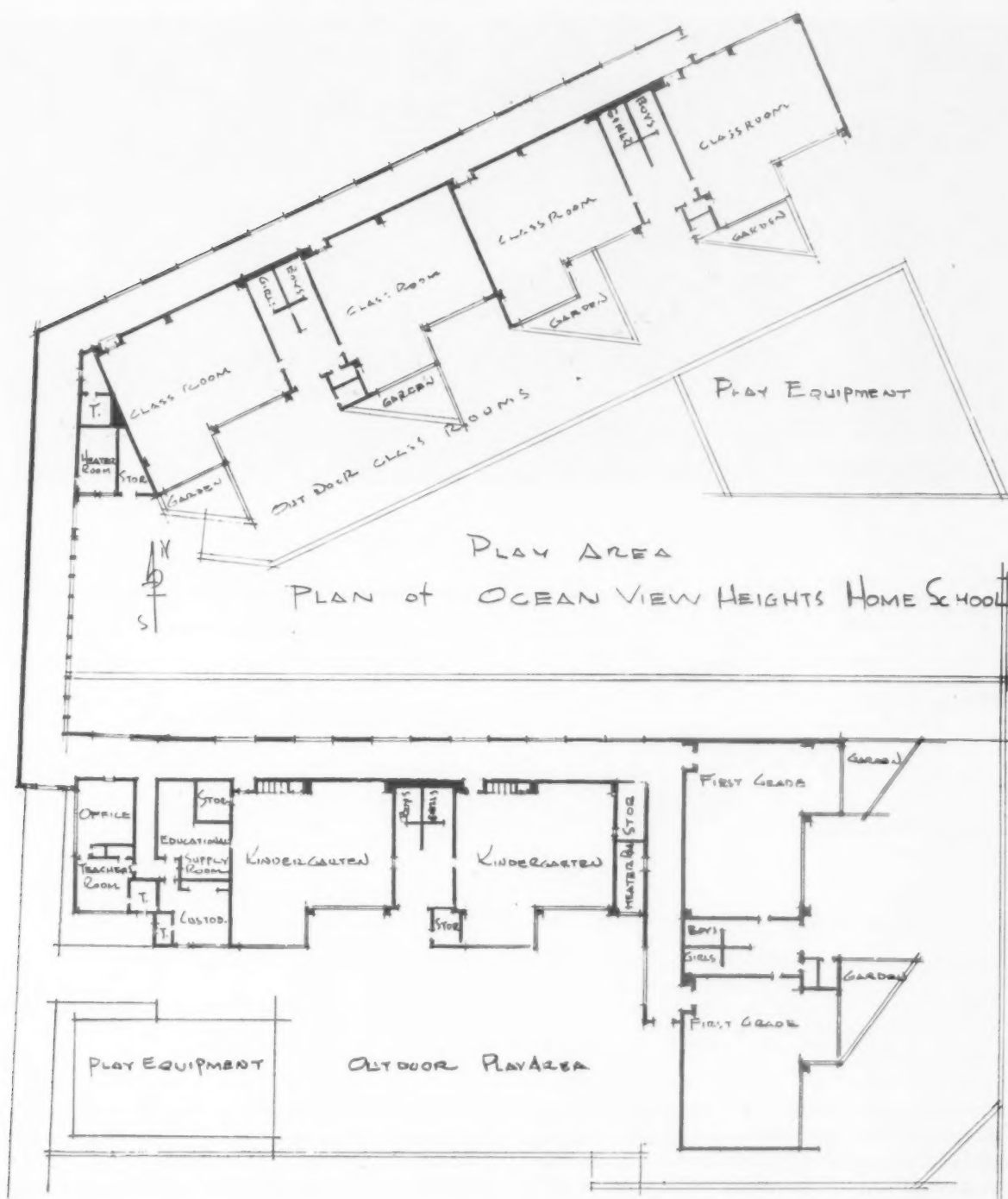
The motion picture and projection section requires a screen placed low enough so that kindergarten children may observe readily. Outlets for a 16-millimeter projector should be provided. Blackout shades should make possible appropriate lighting. In this section provision should be made for projecting shadow figures. Again, electrical connections are necessary. The problems involved in the use of motion pictures must not be minimized. Pictures may be shown to small groups of ten or fifteen children. Planning must make possible bringing such groups together and cutting off lights so that the pictures have clarity and can easily be observed by children at seating heights.

Phonograph area: The phonograph is a most important feature of the kindergarten. A space should be provided where it will be protected. It should be low enough for children to operate it and convenient to electrical outlets. Usually, portable size electric machines are used. It would be helpful to have this area near the exercise unit, since it will also be used for dances and rhythmic activities on the playground.

Storage area for materials and projects of individual children: Shelving 18 inches deep and in sufficient amount to provide for thirty pupils should be located in close proximity to the clothes area. Here the children will store their paper, pencils, paints, and other materials.

The clothes area consists of a series of open lockers with hooks arranged on two sides so that two children may use a locker for their outer garments. Separate compartments should be at the top for hats or lunches. The lower part of the locker should be set aside for children's rubbers. An umbrella stand with provision for drainage should be included in this unit. Some





low seats which the children may use when they put on their rubbers should be nearby.

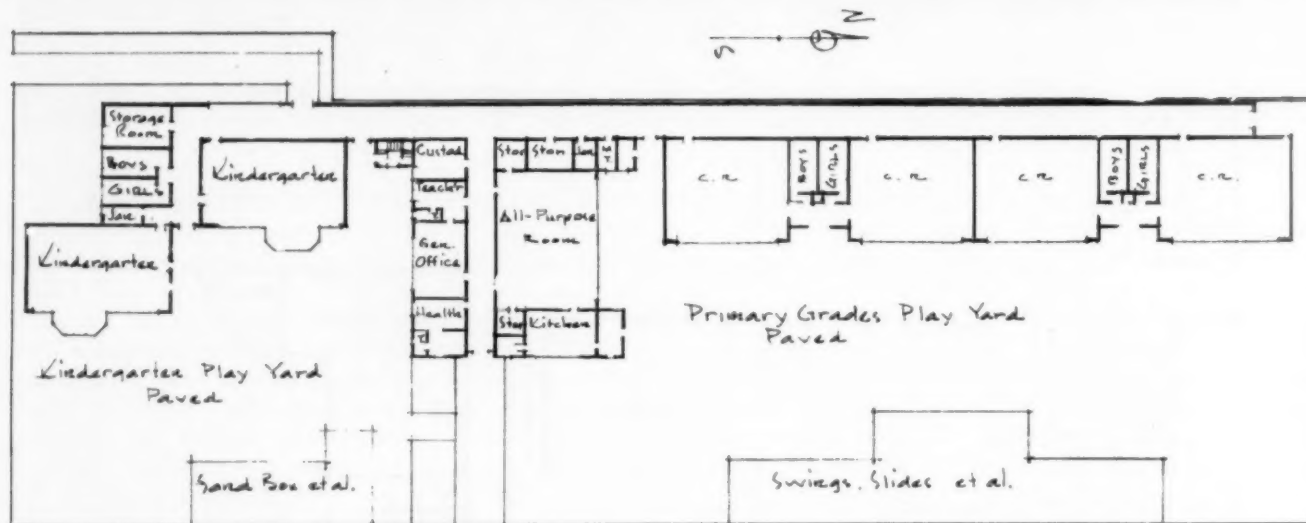
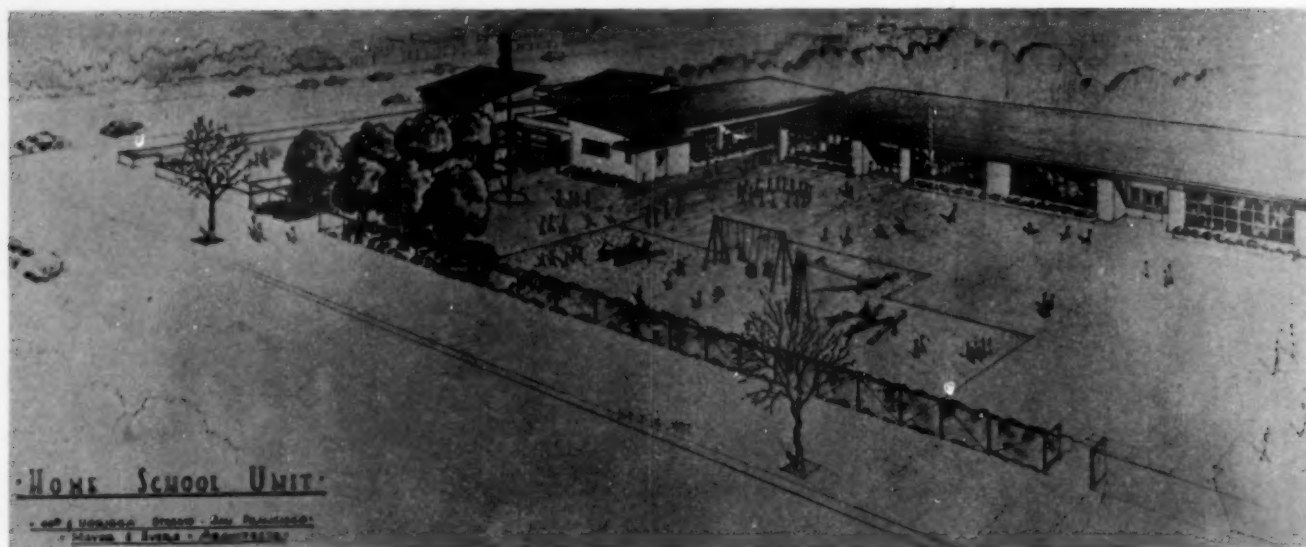
**Teacher's guidance area:** In this section the teacher's desk and chair are close to a two-drawer file cabinet of legal size. The arrangement might also have the teacher's locker close to where she takes care of personal belongings.

**Clean-up area:** Within the larger area there should be provision for washing and drinking. One wash sink with hot and cold water should be installed at a height permitting children to clean their paint pans, brushes, and other utensils. This should have a drainboard for

drying, and a soap container. Storage space for paints and brushes should be provided directly adjacent. There should be also a drinking fountain nearby, adjusted to children's heights.

**Platform-stage:** A small movable platform should be supplied as scenery for the simple dramatics and storytelling procedure for young children. This may be combined with the library corner.

**A possible higher elevation:** In some planning it will be possible to provide a section which is at a higher level than the classroom floor itself. A small railed platform, 3 feet to 4 feet high, which can be



PLAN of NORIEGA HOME SCHOOL

reached by steps or a ladder with handrails, is often used. This serves as the bridge of a ship, or a bus or truck. Children like to get under it and develop a playhouse here in a situation that more nearly conforms to their own child scale.

**Electrical outlets:** It is well to make them double or to provide the equivalent at other strategic points in the room. A duplex outlet on the exterior of the building, out of child reach, will serve the playground when a record player is needed.

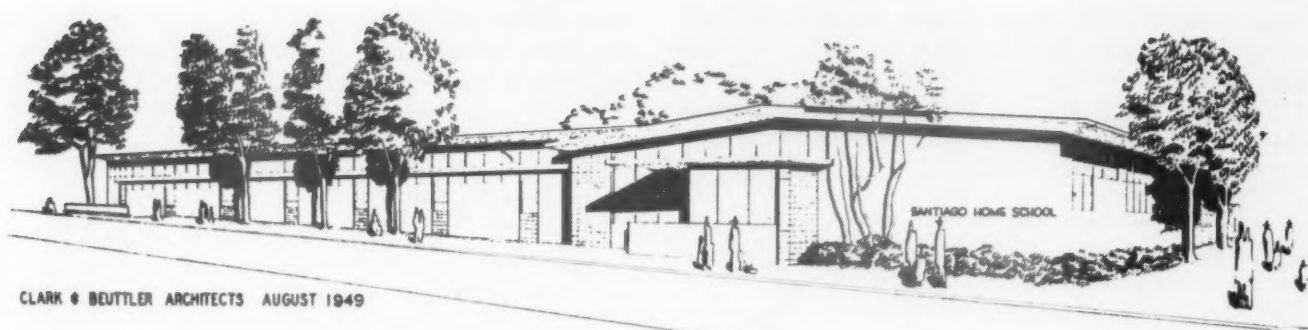
The kindergarten clock should be placed at child level so that it may be used as a teaching device. Preferably its face and general make-up represent characteristics of the storytelling program used in the schools.

**Name of the kindergarten:** Each kindergarten should be given a distinctive name by the board of

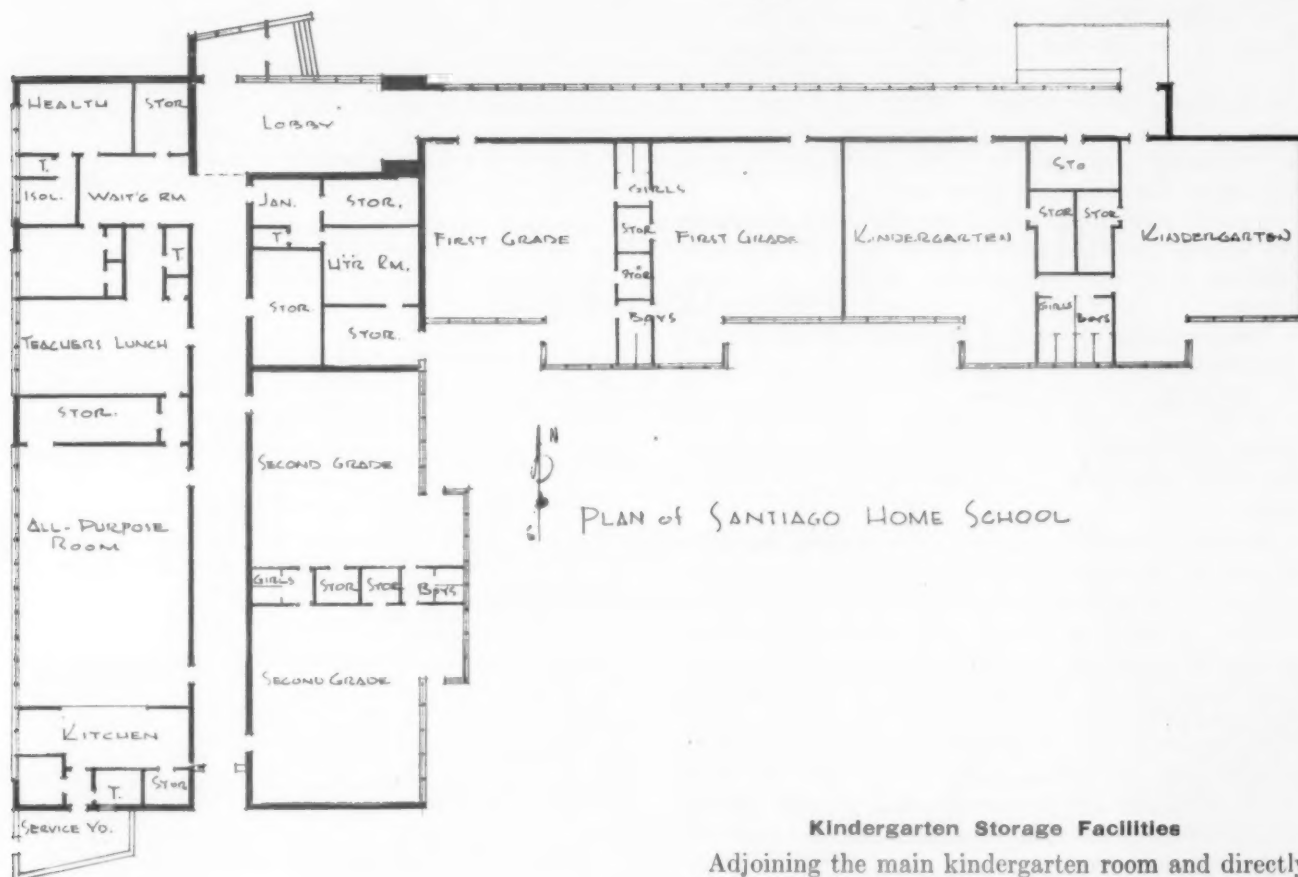
education. The name may be one that has meaning to the children of the area. It may be the name of an outstanding woman of the community in which the building is located, or that of a character appearing in kindergarten literature.

#### The Personal Hygiene Area

The second major section of the kindergarten is a personal hygiene area for toilets and lavatories. Children will be taught to wash their hands, comb their hair, clean their teeth and attend properly to the calls of nature. Shelves should be available for personal belongings. Soap dispenser and paper receptacles are necessary, built in, if possible. Mirrors will be provided, low enough so that a child may observe his entire appearance from head to toe. Separate toilets will be provided the sexes, but the washing and general



CLARK &amp; BEUTLER ARCHITECTS AUGUST 1949



hygiene area should be planned so that supervision by one teacher is readily possible. Toilet stalls will always have doors.

A shoe cleaning section with cleaning cloths should be provided here. This section might be intermediate between two kindergartens if two are proposed in the plan. It should have direct access to the kindergarten playground. Any provision, through glass or openings, which will make possible supervision from the main room, is desirable.

In the kindergarten there should be a six-foot scale on the wall against which children may measure themselves and each other. If placed against a background of cork bulletin board, the children may place their names alongside their heights.

#### Kindergarten Storage Facilities

Adjoining the main kindergarten room and directly accessible to it should be a storage room to take care of equipment used intermittently in the classroom. Shelves and open bins are needed. If kinds of toys and materials used in the kindergarten are studied, they will give an appreciation of the amount of space required. Here also must be stored supplies which are used from time to time by the children. Storage space should be sufficient to carry at least a full year's kindergarten supplies. Special attention should be paid to the sizes of paper so that shelving or drawers will take care of maximum, as well as minimum sizes.

Rugs and coverings for sleeping purposes, large pieces of equipment used indoors, such as slides, teeters and the like, should have storage space. Individual cubicles for personal blanket storage are desirable.

Storage facilities should also be provided near the entrance to the playground to care for the equipment



used outdoors. This might include garden tools, large blocks, and some of the larger pieces of wheeled apparatus.

Custodial slop-sink and paraphernalia storage should be near enough to the kindergarten suite that service can be readily rendered.

#### Outdoor Educational Areas

The home school is so planned that every child may have outdoor space in which to play and work without disturbance from older groups who frequently seek to preempt the play areas. The architect is informed that building facilities and outdoor areas of all kinds should be considered as one comprehensive educational plant. No sharp line can be drawn between educational and play activities. Educational growth is advanced in the building and the outdoor areas. Play or recreation is carried on within the classrooms as well as on the designated play areas.

A rough subdivision of outdoor areas would include the following (contour conditions and the ultimate building plan will necessitate changes of limited degree):

*Landscaped areas* around the building and grounds will contribute to the protection of areas as well as beautification of the project.

*Kindergarten and primary areas:* Areas for kindergarten and primary use, adjoining their rooms, should cover between 2,000 and 3,000 square feet for each room.

*Outdoor classroom and quiet play areas:* Provision of outdoor classrooms may be possible for one or two rooms. A space of about 1,000 square feet, grassed, or partially grassed and paved, with shrubs and perhaps a mounded area for a stage, suffices for this purpose.

*Growing area:* A space should be set aside for pupil gardens.

*Equipment area:* A section should be set aside for installation of playground apparatus. The object, as the architect has already perceived, is to utilize intelligently every square foot of area and to have the planning round out the curriculum of the school itself.

#### Primary Grades' Play Areas

Children in this age level can readily combine play activities with the problems being studied indoors. Planting, digging, building, dramatic play with wagons, tricycles, rhythms, and simple games are major parts of the outdoor program.

Director Daugherty and his assistants, Glenn Mack and Mary Mannelli of the Physical Education Depart-

ment of the San Francisco Schools, have set up their play requirements for the kindergarten and primary yards as follows:

#### Recreation-Kindergarten Yard

Yard equipment and lines for a school having two kindergartens will include these items:

All steel one-piece chute

Game-Time No. 645 or equal, permanently installed

"Jungle gym" or equal type, J. E. Porter Corporation, Ottawa, Illinois

If more than one climbing structure can be installed the second one should be the Game-Time Mountain Climber No. 987, "Mt. Everest" or equal.

For each kindergarten class the requirement is one set of concentric circles, the diameter of the outside circle being 30 feet, inside circle 24 feet, the third circle 18 feet. A single diameter should be painted across all circles.

A 10 foot by 10 foot sandbox with surrounding curb for use by children to balance themselves in walking.

Duplex wall plug for attaching electrical record player out of child reach.

The equipment may also include: A four-board see-saw, 20-inch fulcrum; American Playground Device Company, No. C-164 or equal, Recreation Equipment Company, No. 412 or equal.

An open area for free play is required. Standard school benches for seating of ten children per kindergarten should be placed so that children will not use them to enter the building through windows.

#### First, Second, and Third Grade Yards

For each group a free play area, with no obstructions, should be fringed with the following equipment to be used in common by all grades:

All steel one-piece chute

Four-board see-saws

Round climbing structure, Game-Time No. 987, "Mt. Everest" or equal.

Four Swing Set, 10 feet high, No. C-134, American Playground Equipment Company; Recreation Equipment, No. 400 or equal.

Concentric rings for each grade through the third grade should be painted on the hard surface.

#### Detailed Educational Planning for All Spaces

Detailed educational planning results in an early meeting of the minds of architect and educator and makes possible significant emphasis on every essential detail.

Of approximately sixty school building projects in San Francisco's present school building program eleven are home schools. The complete story of their planning, construction and subsequent use will be an interesting one for educators in the years to come.



A campus-type school—Junior and Senior High School, Orangeburg, South Carolina.

## THE ORANGEBURG PATTERN FOR SCHOOL IMPROVEMENT

By E. W. RUSHTON

Superintendent of Schools, Orangeburg, South Carolina

and G. THOMAS HARMON

Architect, Columbia, South Carolina



Mr. Harmon received his architectural training at the Alabama Polytechnic Institute and the Georgia School of Technology. He also studied at the Ecole des Beaux Arts in Fontainebleau, France. He began his practice in Hartsville, South Carolina, staying there until he entered the Navy in 1942. In 1946 he opened his office in Columbia, South Carolina. Mr. Harmon has designed several outstanding school buildings in South Carolina.

Mr. Rushton received his A.B. degree at Wofford College and his M.A. at the University of South Carolina. He has served as Superintendent of Schools in Simpsonville and in Batesburg-Leesville, South Carolina, and has held his present position as Superintendent of the Orangeburg schools since 1946. For four years before going to Orangeburg, he was State Supervisor in the South Carolina State Department of Education.



**O**RANGEBURG, South Carolina, situated near the state's coastal plain has a mild climate and ample rainfall throughout the year. Population of the school district, which includes the city, is 25,000. Cotton, corn, sweet potatoes, pecans, vegetables, dairy products, livestock, and forest products are main sources of income. The people of the community are homogeneous in origin. They have demonstrated their willingness and ability to work together on a program covering improvements and developments to be accomplished over a period of years.

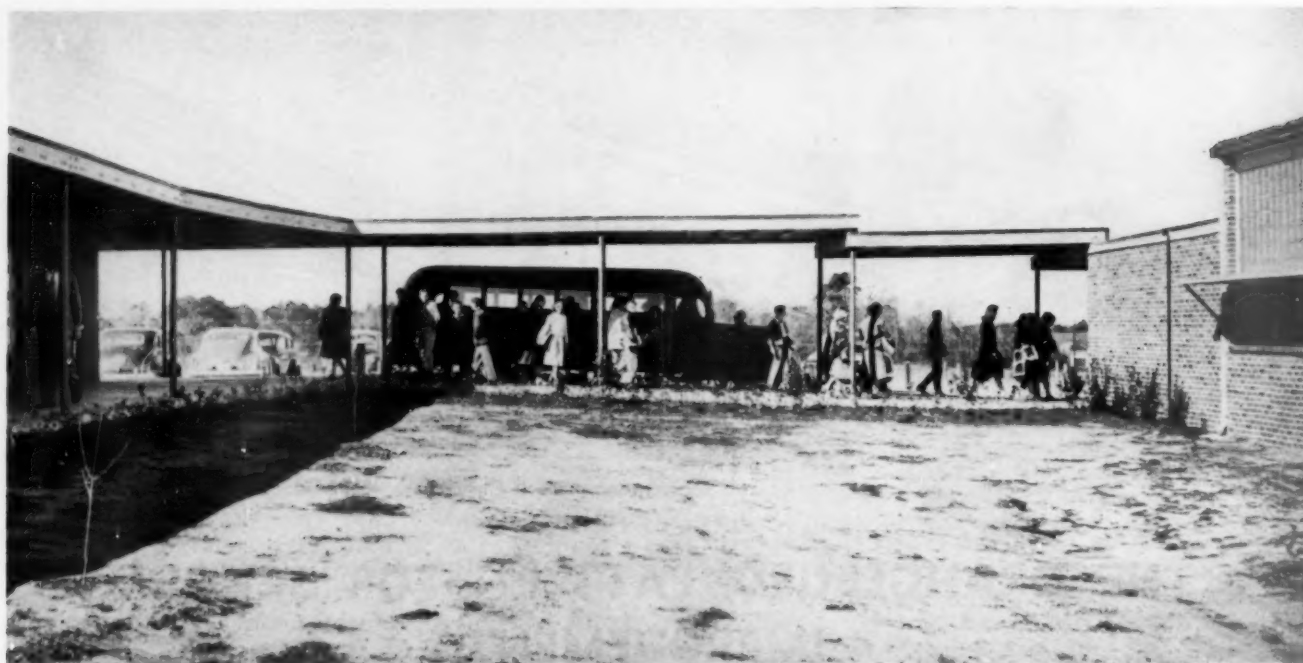
### Educational Planning

In view of the twofold purpose of the school (to develop each child to his maximum capacity and to improve the quality of community life) a deliberate

effort was started in the fall of 1947 to build a comprehensive and long-range program to improve schools. Planning was based on community assets and liabilities, aspirations and understandings of teachers, school administrators, high school youth, and lay citizens, together with an objective survey of the total school system made by the Division of Surveys and Field Services of Peabody College, Nashville, Tennessee.

The community-school concept revealed that there were many people in the community with ability to assist our purposes and to plan the future school program.

The survey report focused attention on building a total school program and adequate school plants for present and increasing school enrollments. From the latter specific need, community groups voted to amend the State Constitution so that the 8 per cent limita-



Covered walkway connecting two units provides protection for pupils while loading and unloading school bus.

tion on assessed property for capital outlay was removed.

#### Problems and Councils

Problems of school organization, site selection, type of plant, character and quality of the school program, and related issues were major considerations. "Bottleneck" of the school system was the need for an adequate high school plant.

Three councils were formed. The Community Council on Education was composed of members of civic, fraternal, social, religious, business and professional organizations. Another group, the Student Council, was composed of high school pupils, and the third group, the Administrative Council, was composed of a classroom teacher from each school, principal of each school, director of instruction, and superintendent of schools. These councils met separately for systematic study and later came together to formulate recommendations presented to the board of trustees of city schools. The school board selected an architect and a professional consultant on school-house planning before taking action.

The process was important because both objective and subjective thinking were part of the decisions. It was the consensus of all groups that school plants should serve the needs of children, youth, and adults so far as practicable.

#### The Accepted Plan

The school board approved the following plan:

1. The secondary school should include the upper six grades of the system (grades seven to twelve) to pro-

vide broader educational opportunities, particularly in survey and tryout courses as a basis for guidance; more economical and flexible use of specialized classrooms and equipment; and more teachers and special services.

2. The junior-senior high school should be constructed to provide for educational needs of youth and for adult education. The campus idea of separate units on a large site was accepted so that the plant may be used all year round for educational, social, recreational, civic, and varied activities.

3. Units should be built and located on the site to accommodate the present enrollment of 1,000 pupils. Plans should be made to increase the size of each unit and the number of units as future developments of the community may determine.

4. The site should be large enough so that the plant may meet set standards. It should be located in a desirable residential area.

#### Selection of Site

When the school board decided on the campus idea for the junior-senior high school, the selection of a site was considered. The board, assisted by a school-house planning consultant, the school architect, local real estate advisers, and a citizens' committee, selected a 26-acre site adjacent to the city limits, but within the school district, in a rapidly growing residential area. This site is in addition to twelve acres that serve as the laboratory for high school agricultural classes.

The site is located north of the city. It is triangular in shape, bordered on the east and west by highways,





Students "dig in" and help beautify school grounds. End view of school's two units.

on the south by a secondary street on which the main entrance is located, and on the north by a merging of the two highways which forms the apex. The entire campus can be seen from the apex. The soil is Norfolk sandy loam which is a good laboratory for science, fine and practical arts, functional mathematics, and conservation, as well as for physical and recreational activities.

#### Campus Type Plan

Planning the junior-senior high school building focused attention on the educational, social, and recreational needs of youth and adults in the community. Installation of surplus army barracks on the present school sites was suggested. This procedure, however, would be a waste of money, since costly items such as flooring, lighting, heating, hardware, and painting for these tentative structures would cost as much as for a permanent building. In addition, the school might suffer for years with undesirable space and atmosphere for teaching. Investigation showed that a large integrated building could not be built economically by doing a small portion at a time.

Further study revealed that a campus type school composed of complete units could be built as funds were available at a cost that did not greatly exceed the cost of temporary buildings. These units would provide for flexibility not obtainable in an integrated building. The campus type school would lend itself to maximum function and economy, as each new unit had benefit of the latest methods at the time of construction.

A tentative campus layout study was made to provide space for the elements that would be required eventually for a junior-senior high school. Plans were formulated for the construction of two units to house the present overflow enrollment of pupils. Temporary arrangements were included within some classrooms for administration, library, music room, health room, teachers' lounge, and cafeteria with the provision that these spaces return to classroom use when additional units are constructed.

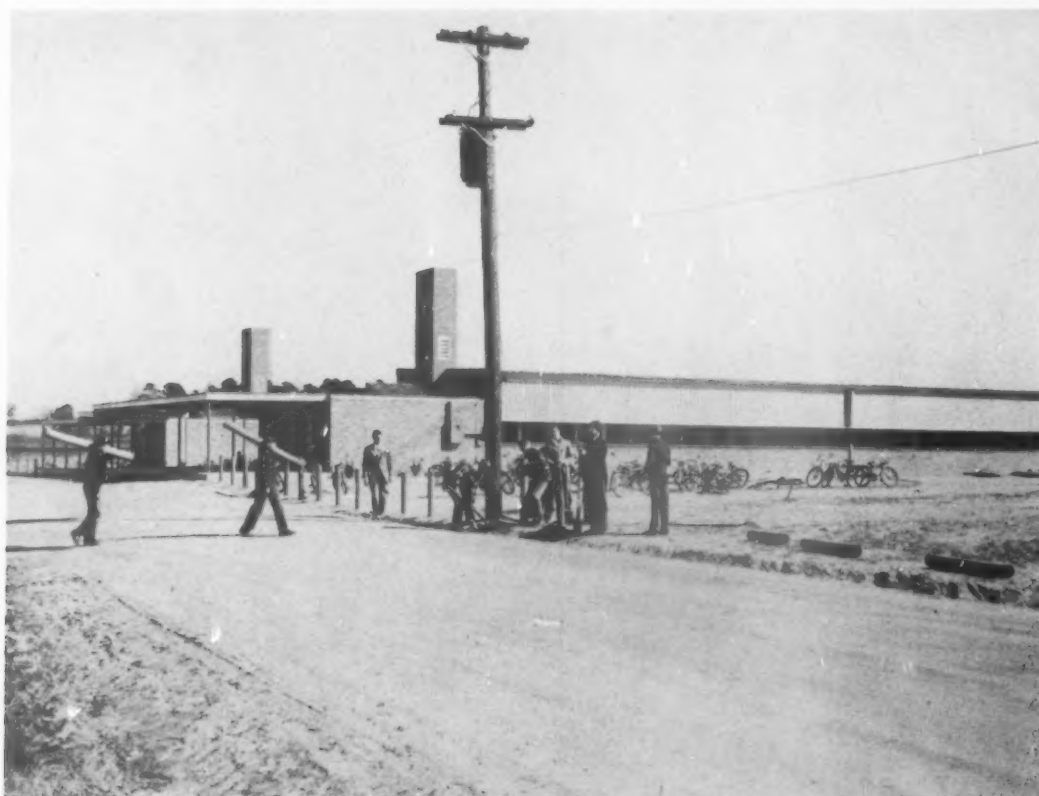
#### Plans for Various Units

During the period from 1947-50 community groups and the school faculty were planning the initial program. The school architect and the superintendent of schools sought counsel and advice from leading authorities in schoolhouse planning and research. They attended conferences on lighting, heating, site selection, school plant design, furniture, and other phases of modern schoolhouse planning and made trips to observe the types of buildings under construction in several southern states. Special attention was given to high school plants, for success of the new venture in modern planning would become a determining factor in the pattern for future buildings in the district.

A master plan of sixteen separate units was proposed by the architect. The plan was first viewed by the school board and later released to a committee of the Community Council on Education and the school faculty for examination with a view to acceptance, or to revision and acceptance.

Lay citizens were keenly interested in the master



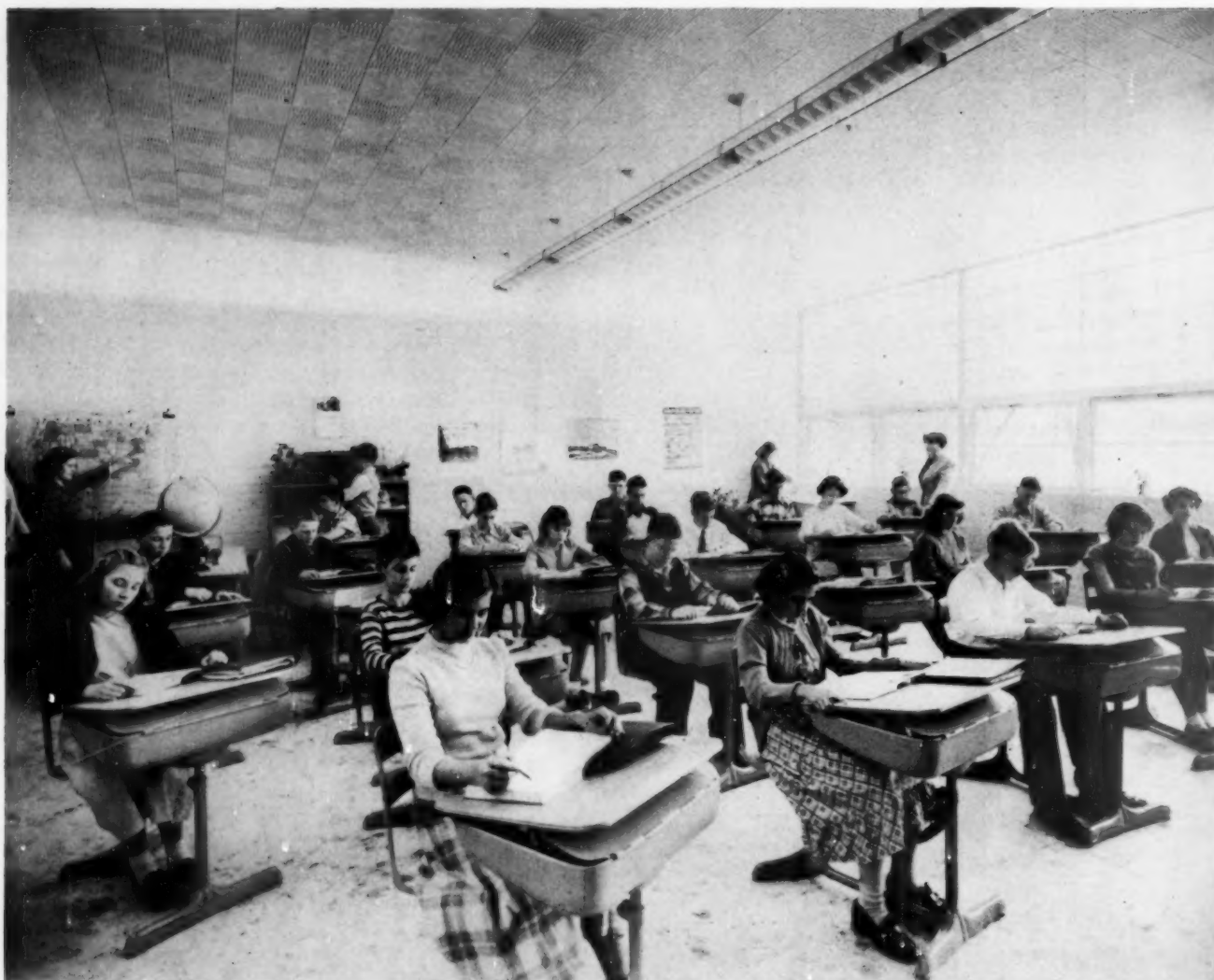


Main entrance to campus.

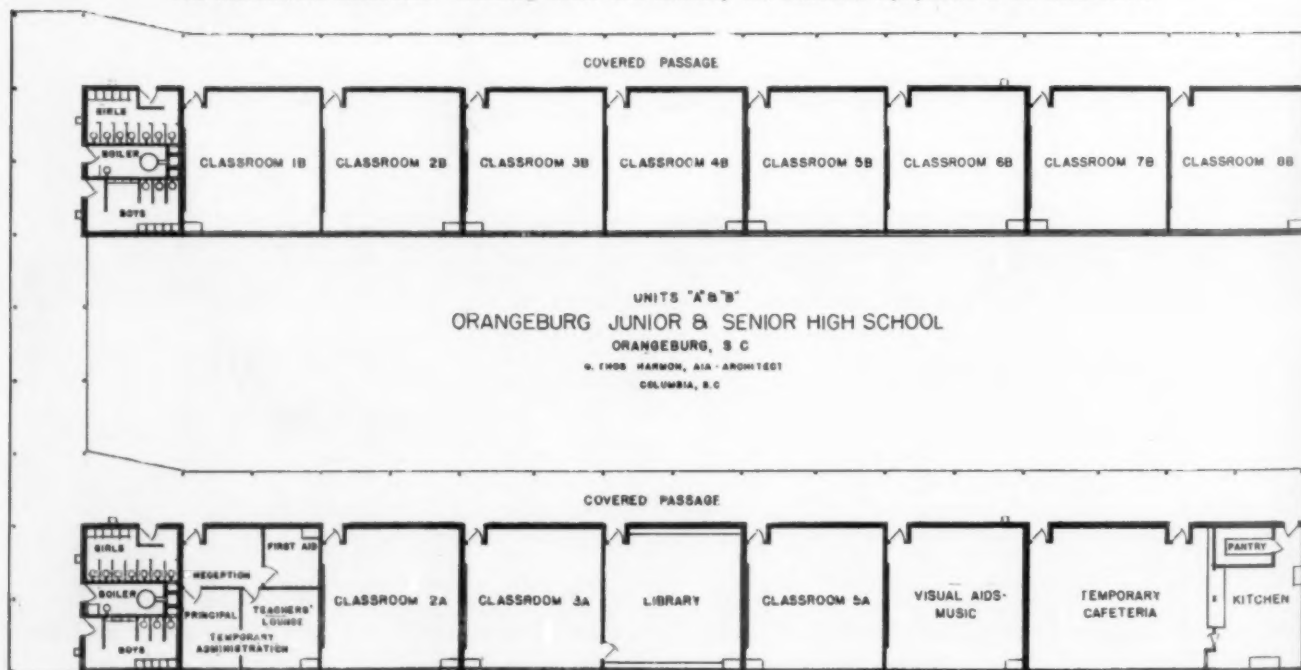


There's lots of room for ball playing in the playground.





The coordinated classroom. Running water and lavatory are standard equipment in all classrooms.





Social studies class in action in the Orangeburg Junior High School. All classrooms have a southern exposure. Directional glass blocks admit maximum light and reduce glare.

capital outlay only two units could be built. These units have sixteen classrooms, 28 feet by 28 feet. Because of minimum services which must be provided, one unit of eight classrooms has been designated to provide two permanent classrooms and temporary accommodations for a cafeteria, library, health room, teachers' lounge, principal's office, reception room, and multiple-use space for music, visual aids, and assembly. There are also ten classrooms for 360 pupils.

The school board has requested the county legislative delegation to introduce and support a bill in the state legislature which will enable the people of the school district to vote on a bond issue. This would provide funds required to build the six-year high school, to construct other buildings urgently needed, and to modernize existing school plants. The plight of the school district is obvious even to a casual

observer. Additional funds from state and federal sources are sorely needed to care for basic needs of children, youth, and adults regarding decent school plant and equipment.

#### Unique Features

In deciding upon the building design and construction materials, we thought first about suitable space for flexibility in teaching, a pleasant environment, sanitation, safety, adequate ventilation, maximum light without glare, automatically controlled heating, and economy of construction.

All classrooms are oriented so that the window wall has a southern exposure and the clerestory wall a northern exposure. Directional glass blocks are used in the window wall to admit maximum light and reduce glare. Vision strip windows under the glass blocks permit viewing and ventilation. A metal can-

opy over the vision strip intercepts the sun's rays, thus reducing glare, while windows on the north clere-story wall introduce bilateral lighting and provide cross ventilation.

Walls are two courses of 4-inch brick and are tied together with steel Z bars with a 2-inch air space in the center of the wall. Asphalt tile floors are constructed of concrete on grade. Cream-colored chalkboards require the use of soap crayon free of dust. Tackboards are light gray fiberboard. To insure balanced lighting, interior walls are painted in pastel colors on natural brick with attention to their light-reflecting values.

Slim-line fluorescent lights with 45 degree shielding are installed throughout the building. Sinks are provided in all classrooms to comply with a unanimous request from teachers. Buildings have radiant heated floor slabs and each unit has its own oil-burning automatic boiler.

Sanitation in toilet rooms was carefully considered. Floors are quarry tile sloped to a floor drain. Walls are ceramic glazed structural tile from floor to ceiling. In lieu of windows there is a large skylight over each toilet room to admit light and sunrays for disinfecting. A hose bibb is in each toilet room so that the entire room can easily be washed with minimum effort. These spaces are ventilated by a natural flue gravity in the same chimney that carries the boiler stack. Grilles in the doors provide for air intake.

We wanted to increase the cheerfulness of the buildings by the choice of furnishings. The teachers' lounge, the principal's office, and the reception room are furnished with contemporary bent ply-board furniture upholstered with washable material in bright colors. Classrooms are furnished with tables, extra chairs, and desks with 10-degree and 20-degree tilt tops or chair desks.

Since Orangeburg enjoys a temperate climate, corridors connecting with a covered passageway and then with all buildings, are left open. All doorways to

classrooms are slightly recessed so that doors do not interfere with passage along the corridor.

#### Impact of Community-School Pattern

The Orangeburg pattern is not yet complete. Three years have passed and it will take nine more for Orangeburg to realize its vision.

The basic assumption of the local school program is that progress in education depends upon the aspirations and understandings of the faculty and lay citizens. Aspirations have strength when they are widely shared and validity when they take into account the realities of particular situations. Understandings disclose alternatives to action and make possible next steps in moving from where we are to where we want to go.

Improvement in educational opportunities for children, youth, and adults is possible only when thought is ahead of realization. Leadership in Orangeburg is becoming aroused to the realization of many basic needs in a comprehensive educational program to be achieved on a long-range schematic approach.

Justification of comprehensive planning is twofold. What is done to parts of the school program affects the total school program. What needs to be done to parts of the school program can be determined best from the perspective of the total.

A procedure to follow through the comprehensive program has been set up in the framework of seven major lines, namely: the purposes of education in a democracy, curriculum and instruction, school plant, school staff, school administration, school finance, and evaluation. Each step in the comprehensive program is evaluated in the light of critical analysis.

The impact of the Orangeburg pattern tells what happens when a group of individuals—teachers, administrators, high school pupils, members of the school board and other representative lay citizens—set out to develop and to make effective comprehensive plans for improvement of schools over a period of years.



# IMPORTANCE OF SITE SELECTION IN COMSTOCK, MICHIGAN

By JOHN LATTIN

Louis C. Kingscott and Associates, Architects, Kalamazoo

and LESLIE F. GREENE

Superintendent of Comstock Schools



L. F. Greene received his A.B. from Kalamazoo College, his M.A. from the University of Michigan. He has been Superintendent of Schools at Hopkins, Constantine, Mendon, Michigan, and has been at Comstock since 1946.



John A. Lattin holds the position of administrative assistant with the firm of Louis C. Kingscott and Associates, Inc., Architects and Engineers, Kalamazoo, Michigan.

COMSTOCK, MICHIGAN, a suburban community, is bisected from east to west by the Kalamazoo River and U. S. Route 12. It is a residential area of approximately 5,000 population in average-to-low income groups.

School enrollment increased 33½ per cent in the five-year period prior to 1949. Even though the district had completed five additions to the central building since 1929, it could not keep up with increasing enrollment.

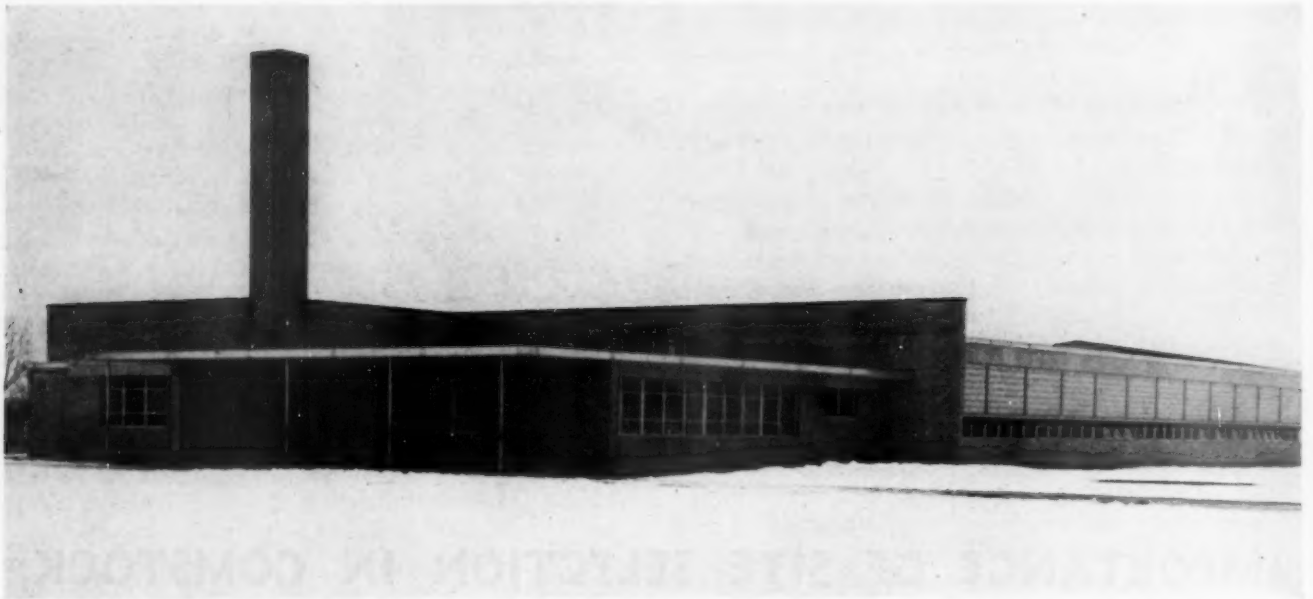
The board of education submitted a proposal to the people of the district for a sixteen-room, one-story elementary building with an all-purpose room. The site was to be at the eastern extremity of the present school district. The proposal was defeated by only

two votes under the necessary two-thirds majority. A month later the issue was again tried and defeated by a larger vote.

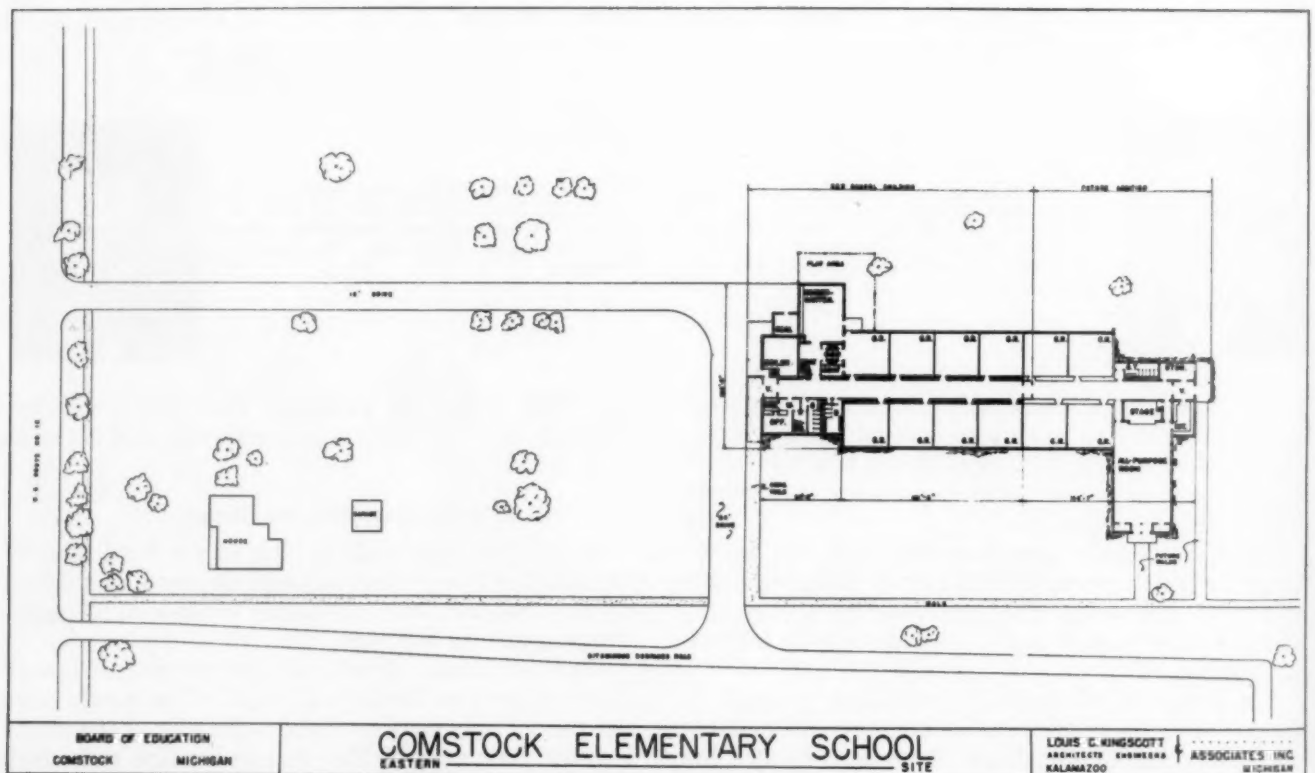
## Poor Location the Reason

An analysis was made to find why a bond issue of 12 mills for five years was twice defeated in a school district that had been continually confronted by building programs in the past.

Location caused defeat, not the amount of money involved, as was formerly thought. The people were not particularly concerned about the cost of the building, but they were divided on site location and which side of the river it should be. Some favored the present central building site, declared inadequate by



Comstock Eastern School was erected on a 16½ acre site at a cost of \$10.82 per square foot (including landscaping, yard work, well, septic tanks, storm sewers). Entrance shelter by driveway protects students boarding buses in stormy weather.



Comstock Eastern's plan provides sharp contrast to the Western School layout, page 274. Both schools used same structural materials, but differ in design according to location of site. Note use of single- and double-loaded corridors.

the Michigan State Department of Education. Because of these conflicting opinions, the board of education had to decide where to construct a school.

After many discussions, the board presented a plan for building one nine-room and one seven-room school on opposite sides of town and opposite sides of the river—more children would be close to a home area school. This plan met with immediate approval by Comstock voters who passed the bond issue almost five to one.

#### Comstock Eastern

The first unit, Comstock Eastern School, occupies a sixteen and one-half acre site, with adequate space for playground and future expansion. The gently rolling terrain provides excellent natural drainage. A bituminous surfaced playground for early elementary students is enclosed by a fence. A shelter over the entrance next to the driveway protects students from inclement weather while they load buses. The shape of the site necessitated north-south orientation of the building, thus providing east and west lighting.

Function and visual comfort distinguish this single-story school. There are several interesting features,

such as the double-loaded corridor with recessed lockers. Square classrooms, more flexible than rectangular ones, have a painted cinder-block interior and glazed tile below the windows and chalkboard. Recessed metal cabinets provide storage space. Large areas of tackboard cover walls beside chalkboards. Asphalt tile is used on part of the floor. Acoustical tile forms the ceiling. Expanses of directional glass block on both sides of the classroom tend to give an even distribution of light. A sunshade installed over the clear vision strip eliminates direct sunlight and sky-brightness and a concentric ring fixture with a frosted silver bowl provides artificial lighting.

Light pastels are used in rooms, trim and floor covering. All furnishings are blond to reflect as much light as possible.

The kindergarten and first grades are self-contained units with outside exits. There are separate boy and girl toilet rooms and cloak rooms rather than individual lockers.

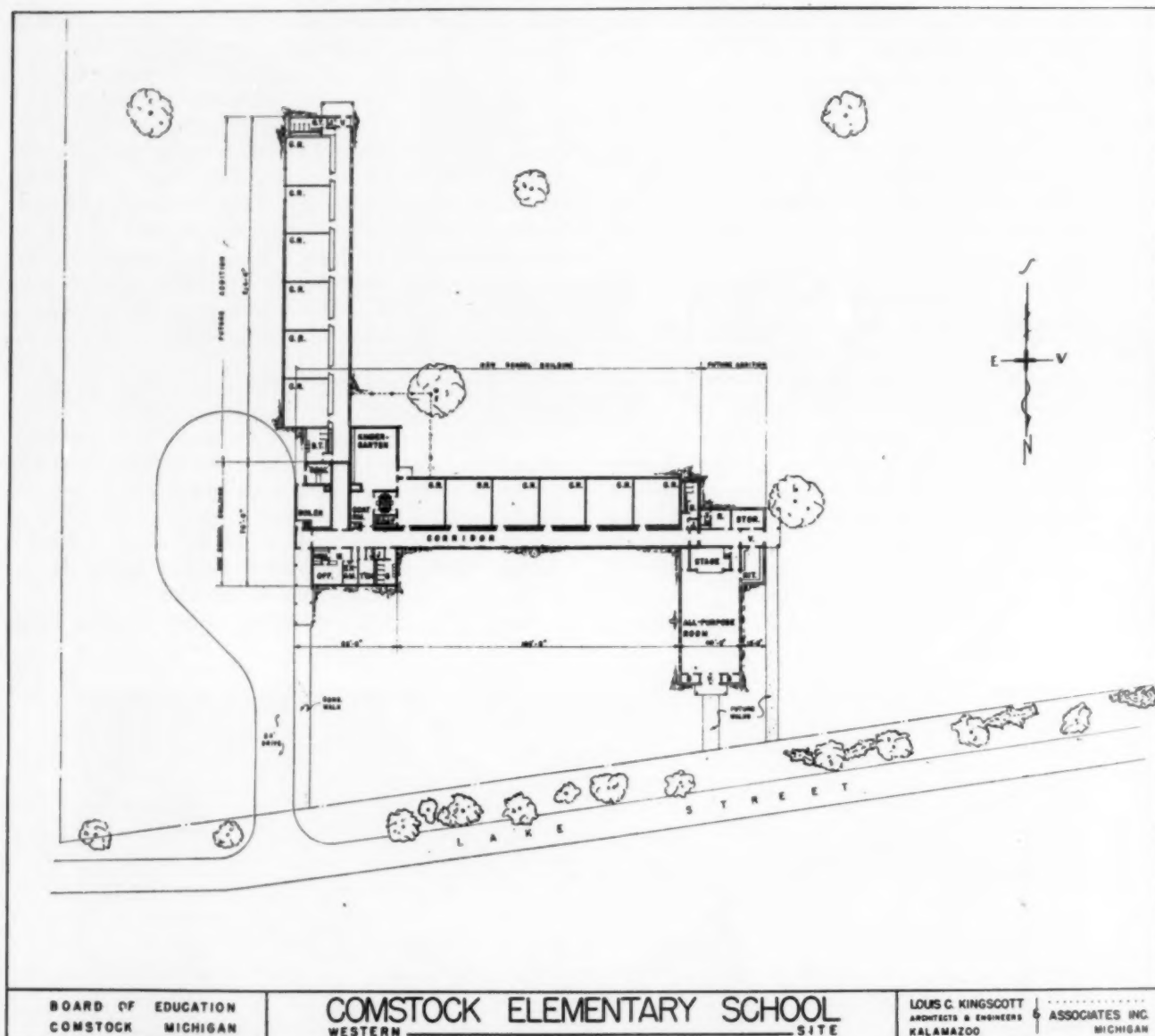
Terrazzo has been used in the corridors and toilet rooms. Glazed tile is used to ceiling height in the latter. Acoustical tile covers corridor ceilings.

Other noteworthy details are radiant-heated floors,



Kindergarten tots at Comstock are exclusive. They have a private exit to their special bituminous surfaced playground, their own toilet facilities and cloak rooms. Radiant heating enables them to sit on the asphalt tile floor.





Plans of Comstock Western show areas for proposed expansion and use of single loaded corridors to provide better light.

a face brick exterior, and a built-up, twenty year bonded roof. All roof drainage is carried inside downspouts to prevent freezing. Utilities are carried in a tunnel under the corridor.

Cost of the structure including landscaping, yard work, a well, septic tanks, and storm sewers was \$10.82 a square foot. This figure also included a boiler large enough for a sizable future addition. Construction began February, 1949, and finished September, 1949.

#### Comstock Western

Comstock Western School, the second unit, is located on a 22½-acre site on the western edge of Comstock. This location dictated an east-west orientation, thus providing north-south lighting. Uniform lighting has been achieved by a single-loaded

corridor with the clerestory toward the north, and glass block walls on both sides of the classroom. Basic classroom construction was the same as in the eastern school.

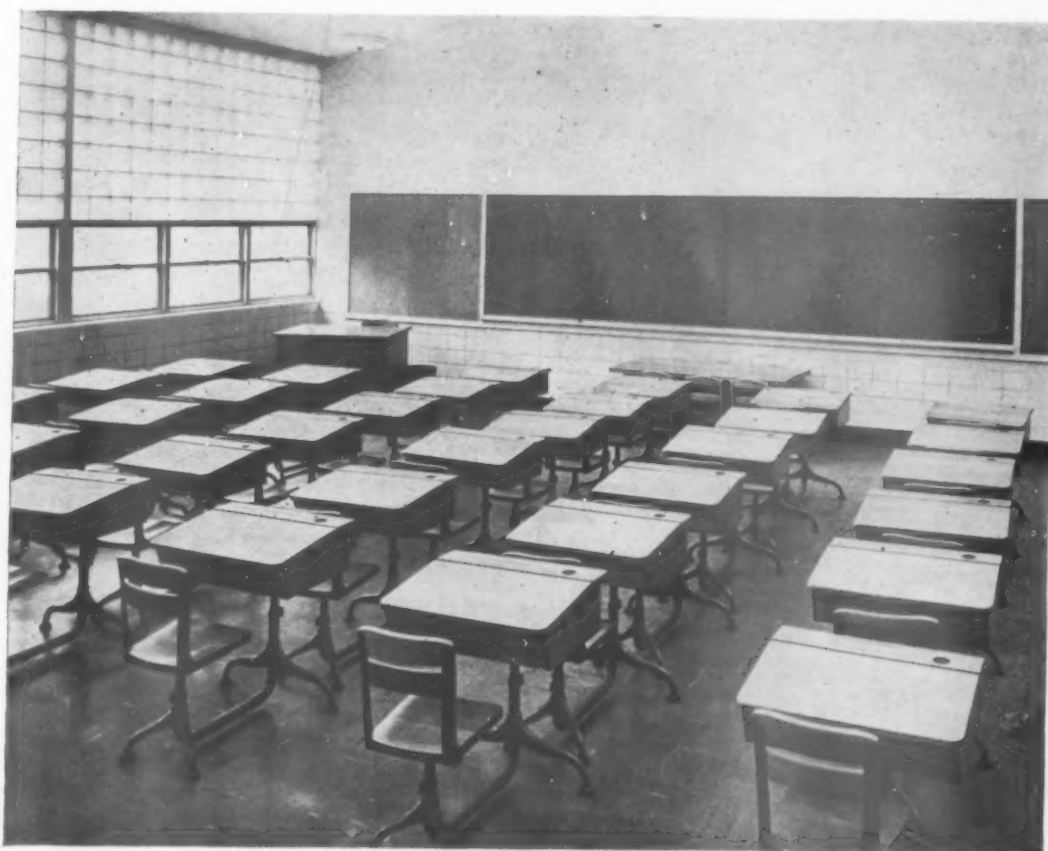
Cost was \$11.15 per square foot, which might indicate that a double-loaded corridor is more economical as both schools were built at the same time by the same contractor. Both schools plan future additions.

#### Shining Virtues

Functional features of the elementary buildings permit flexible school program. Consequently, teachers and children arrange the movable desks in circles, rectangles or other combinations suitable to social living and group activities. The bilateral lighting allows abundant natural light in all parts of the rooms.



Comstock Western School was erected on a  $22\frac{1}{2}$ -acre site on the western edge of town at a cost of \$11.15 per square foot.



This picture of a Comstock classroom, taken without artificial lighting, illustrates absence of shadows on desks. Bilateral lighting has been achieved by directional glass blocks on both sides of the room.

Shadows have been eliminated on the desks. Work on the green chalkboards can be read without glare from any angle in the room.

Quiet halls and rooms derive from cinder block walls and acoustical ceilings. The sloping-room ceiling not only helps absorb sound, but it also increases the efficiency of natural ventilation. (Outside air from vented windows follows the funnel-like action of the ceiling to ventilators on the opposite side.) Children can talk and walk naturally without raising the echo familiar in older structures. Instructional games in one area do not disturb another.

The electronic clock and signal system is a great asset at dismissing and recess time—regular class hour bells are not necessary. Synchronized clocks help control children on a fixed bus schedule.

The radiant heating and natural ventilation have not been used long enough to determine whether or not we have less absenteeism than in the conventional

building. However, rooms do remain at a set temperature. The most comfortable temperature is 70 degrees. Heat panels in the floor permit children to sit and play on the floor without fear of drafts.

The buildings operate efficiently. Electric bills compare favorably with home bills. The average bill for light and power during the winter has been \$45.00 per month. The amount of coal consumed in heating is negligible compared with that of our other type heating plant. The two smaller buildings apparently are doing everything that one large building could have done and probably a little more. Louis C. Kingscott and Associates, architects, designed these new Comstock schools.

This program has convinced us of two points. People want to build needed school buildings regardless of personal cost, within reasonable limits. The second is that site location may be a more vital issue than the amount of money.



## A RURAL COMMUNITY—ITS SCHOOL SITES 1950-2000

By W. THEODORE BOSTON

County Superintendent of Schools, Cambridge, Maryland

THIS is a story of an attempt of a rural county to select school sites for needed improvement in the school program and plant. It is also the story of an attempt to anticipate future needs for school sites and to assure that adequate space will be available for the school program in the future. Dorchester County is 510 square miles in area with a population of more than 30,000 of whom 12,000 reside in the county seat town of Cambridge. The population is roughly 70 per cent white and 30 per cent Negro.

During the war years it was realized that an increase in county birth rate, plus the fact that no major building projects had been undertaken in the past ten years, would throw ever-increasing burdens on county school facilities. As in a great many eastern areas, high schools had been established quite early and were in operation for a long period in six county towns and villages.

The board of education, prior to and during the war years, realized that with the possible exception of Cambridge High School all of these units were much too small to offer the young people of the county the well rounded program which modern living demands. This need for larger units was discussed with individual parents and community leaders on numerous occasions, during the period when no actual construction work could be undertaken.



Mr. Boston, of Maryland, received his A.B. degree at Washington College and his M.A. at the University of Maryland. In addition he has done further graduate work at George Washington University. His career in the field of education has followed the usual pattern—teacher, principal, and superintendent of schools. He is a member of the American Association of School Administrators, the National Education Association, and the Department of Rural Education.

At the close of the war many school patrons in the rural areas of the county thoroughly agreed that the prohibitive cost would not permit their children to secure the kind of educational program which they wanted in the small high schools of the areas in which they happened to live. However, many people questioned the advisability of providing larger units, particularly those who no longer had children in school. Then, too, the location of such schools, if built, was one on which little agreement could be found.

### State Aid to Building

In 1947 the Maryland State Legislature, among other school legislation, passed a School Building Incentive Fund Law which provided state aid to the local county units for the purchase of school sites and the erection of new school buildings. The Dorchester

County Board of Education immediately began to deposit the money received from the Incentive Fund in a special account intended for application toward the purchase of sites.

Early in 1948 it was decided to make a thorough survey of the county's educational facilities and its needs. The services of Engelhardt, Engelhardt, and Leggett, Educational Consultants, 59 Park Avenue, New York City, were secured. Work on the survey was based on a very thorough study of the following factors:

1. A full study of adult and school population with future projections. This study included spot maps showing the homes of children by age levels.
2. An examination of prevailing school organization and proposals for advancement.
3. An analysis of existing plants and decisions covering their future use.
4. Proposals for renovation and modernization of buildings to be retained.
5. A comprehensive plan of all new buildings that can now be anticipated for future use.
6. The preparation of maps, charts and other data for public interpretation and clarification.
7. Recommendations of buildings to be built at various intervals in a long-time program.

This survey had been timed with a period when the school bonded debt had decreased sharply. In November, 1948, results of the survey were ready for presentation to the board of education. N. L. Engelhardt, Sr., presented to the board of education a report of present assets in existing buildings, immediate needs for additional educational facilities and probable future developments to be considered. He also unfolded many possibilities for doing a much more adequate job in training young people of the community to take advantage of the opportunities around them and to prepare better for the complicated present-day living processes.

The county board of education, impressed by the facts in the survey, immediately expressed an interest in future pursuit of the problems. While the survey work was in progress Stanton Leggett visited all school communities of the county and discussed the school program with many school patrons whom he had happened to meet. In addition, Dr. Engelhardt, Sr., talked to the superintendent of schools and individual board members about several of the prospective sites which the survey had indicated would be desirable for the location of new school units.

#### Search for Land Begins

After Dr. Engelhardt's presentation of the survey, the superintendent of schools was authorized to contact a local real estate agent, who had previously served on the board and still maintains an active interest in board of education affairs. A few days later the real estate agent, the county superintendent, and various committees from the board discussed specific

properties. They wanted sites for high school use that would not be less than twenty acres in size and that would have considerably more acreage to be acquired whenever possible. In each locality where prospective school sites had been indicated, the realtor was instructed to secure options on two to four properties. These options were obtained in some three weeks. In the meantime local newspapers, one of which was edited by a member of the board of education, had cooperated fully in giving publicity to the survey and to the recommendations. The superintendent of schools had also discussed the survey with several parent-teacher groups of the county and attempted to answer questions as to why certain specific recommendations, the locations of sites, and the consolidation of existing schools had been made.

The Board of Education of Dorchester County is made up of six members whose homes and business activities are scattered over wide areas of the county. Each community in a school district, when the matter of school improvements is under consideration, is generally interested not only in holding its own facilities, but also in improving them. Such was the case at the outset in this program, but within the meetings of the board there existed an unexcelled spirit of "give and take" on the matter of final location for the two consolidated units. Those patrons, who had been doubtful as to the wisdom of abandoning the smaller units, were won over almost without exception after the survey recommendations had been reproduced, distributed and discussed.

The Board of Education then announced the ownership of options on various properties in the areas that required new building construction and invited comment and discussion of the sites under consideration.

#### Priorities Set Up

The Survey had brought forth recommendations for action in two priority groups: the first to be undertaken immediately; the second, within a period of five to ten years. First priority was to be given to the consolidated high school in the north section of the county, to a new high school for Negroes in Cambridge, a consolidated school in the south portion of the county and consideration of expanding the site of the high school in the City of Cambridge. Immediate consideration was therefore given to their space requirements. Because the real estate agency had acted promptly in securing the options, all but one of the sites finally chosen had been brought under legal contract for purchase before there was any public knowledge that school sites were under consideration. Each option was purchased at figures ranging from \$100 to \$200. Even for the properties which were not finally bought, the small cost was repaid many times in the relatively low figure for the sites actually chosen for use.

In the north county a sixty-acre site of gently rolling loamy soil was selected in open country roughly bounded on three sides by three existing small high

schools. The survey had shown that 90 per cent of the future pupils of the proposed high school lived within a radius of 10 miles of the site location. This site, purchased for \$12,000, included a farm house with out-buildings which can be renovated for the use of the custodian and probably some of the actual activities of the high school.

Two other options had been secured on nearby properties. However, before a fourth option in this area had been secured some indication that a school site was being considered became public knowledge. The quotation given the real estate agency on the fourth property was \$40,000 although its area approximated that of the other site purchased for \$12,000. This gives some idea of the savings that can be effected through the use of options on desirable locations before buying plans of boards are made public.

#### Site for Negro School

In locating a site for the high school for Negroes, consideration was first given to three areas which were under multiple ownership, but the prices were excessive for relatively cheap land and another location was sought. The fourth option, too, was taken before information on the search for sites became public.

On the outskirts of the Negro section of the city an area was found consisting of 100 acres under one ownership. This site contained some 65 acres of land, used for production of crops, and the remainder was in growing timber. The last proposal was, if anything, more desirable from the standpoint of elevation and drainage than either of the previous three. It so happened that almost the same day it was considered a possibility the owner posted this property for sale to some real estate agencies of the city. An option was, therefore, promptly signed for purchase of this property at \$8,000. After the possibility of the acquisition was made public, several school patrons, as well as some of the board members, felt that it was too far out of city limits. However, it was pointed out that more than sixty per cent of the pupils of this school were transported by bus anyhow. The rest of the pupils would not have to walk more than 9/10 of a mile, and even this distance could be shortened through the development of one new street. So this site was approved and purchased.

The site accommodates all the space required in the athletic program, experimental plots in the development of the agricultural program and woodland for the study of farm wood-lot management and recreational activities such as camping and Boy Scout and Girl Scout work. There is also space available for an elementary unit should future population growth demand its construction.

#### Solution in Southern Section

In the southern section of the county, the survey had recommended that two very small schools be consolidated into one unit. Transportation to Cambridge had been mentioned but some of the pupils on

the far end of bus routes would have had to ride 35 to 40 miles over roads, which while hard surfaced were not of the best. The distance was prohibitive.

This section of the county borders the waterfront areas and people of the villages depend almost entirely upon the production and marketing of oysters, crabs and fish and related activities for a livelihood. There are also some wild-fowl hunting parties and trapping in the marsh lands. Much of this land is too low to be desirable for a school site but one suitable location—the one purchased—consisted of twenty acres with some wooded portions. It had been hoped that an area bordering one of the waterways could be secured so that boat building, boat repairing, and the making and repairing of equipment used in the seafood industry might be more easily incorporated in the school's program. However, it was not possible to secure a site that would otherwise be suitable for a school. Therefore a lot of one-half acre to one acre within one or two miles of the school site is still being sought. The plan for this area is to develop a program that will include academic subjects and the fields mentioned above. In this way, the program will more closely relate to life and work in a waterfront community in which the majority of these young people—by requirement or choice—will one day take their place. The curriculum for this school is now in process of development. The Maryland State Tidewater Fisheries Commission, as well as the Maryland Biological Laboratory at Solomons, Maryland, are closely associated with the county school administrative staff in furthering in every way possible the proposed program for this school.

#### Colonial Estate Added

The fourth site purchased is located in an area adjacent to the present Cambridge High School. A colonial estate in the process of liquidation was secured. The 21 acres of well drained land in a rectangular block are separated from the school by 150 feet of property which could not be purchased. This land is situated in a rapidly growing section of the city and it was felt that future needs for a home-school unit here, as well as immediate needs, demanded the purchase of the entire area. The cost of this site was \$30,000, much higher than either of the others, but still by standards of school site values, cheaper than anything else which will probably be provided for the entire program. As one of our board members said, "A good building site is the cheapest thing which we can provide in our building program but probably one of the best. Why not give our pupils plenty of it?"

To complete a ring of school sites around the city of Cambridge one site remains to be purchased. This, it is hoped, will be accomplished within the next few months. All sites were paid for from the receipts of the State School Building Incentive Fund. The real estate agency was paid in each case by the individuals selling the sites as the approach was made to each



owner on the basis that a customer was now available who would be interested in the purchase of his property. Services of the agency at the prevailing 5 per cent of sale price were offered for handling the deal.

In February, 1949, the board of education had made its request for a bond issue to finance the construction of needed schools to the county commissioners who are the fiscal agents for all governmental services in the counties of Maryland. The usual procedure is for the board of education and the county commissioners jointly to request legislative delegates to present a bond bill to the State Legislature. This bill may be presented either with or without the requirement of a referendum. At the time of the legislative session the county commissioners, legislative delegation and board of education held a joint meeting at Annapolis to discuss this matter. A bond bill for \$3,000,000 was presented without referendum, passed

by the legislature and became law with the signature of the Governor of Maryland in May, 1949.

The process of the selection of architects is now in progress for three of the schools listed in the first priority. A number of meetings have been scheduled with interested patrons and teachers for the formulation of a program that the people of the communities concerned agree will best meet the needs of their children. It is now generally felt that the consolidation of the high school units alone will constitute one of the greatest advances in educational opportunity the county has ever made.

In the absence of any great influx in population or growth beyond points which can now be predicted there seems to be little possibility that the school system of Dorchester County will be handicapped because of a lack of adequate land areas within the next fifty years.



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National Training School of the Boy Scouts of America, Mendham, New Jersey.

## AUDIO-VISUAL AIDS FACILITIES IN A NEW EDUCATIONAL BUILDING\*

By IRVINE H. MILLGATE and ROGER S. HALL

Director and Assistant Director, Visual Education Service, National Council  
Boy Scouts of America

A GROUP of Scouters at the National Training School of the Boy Scouts of America are gathered in a classroom of their new center at Mendham, New Jersey. The instructor has been discussing the preparation of programs for troops and patrols.

"Now, gentlemen," he continues, "let's see how this program planning actually works in the patrol and troop." Without moving from the lectern, he changes the informal classroom into a theater. Reaching toward the panel before him, he warms up a sound amplifier, switches out the room lights and turns on a

motion picture projector. Three quick twists of the wrist and the Scouters are viewing an actual program-planning situation.

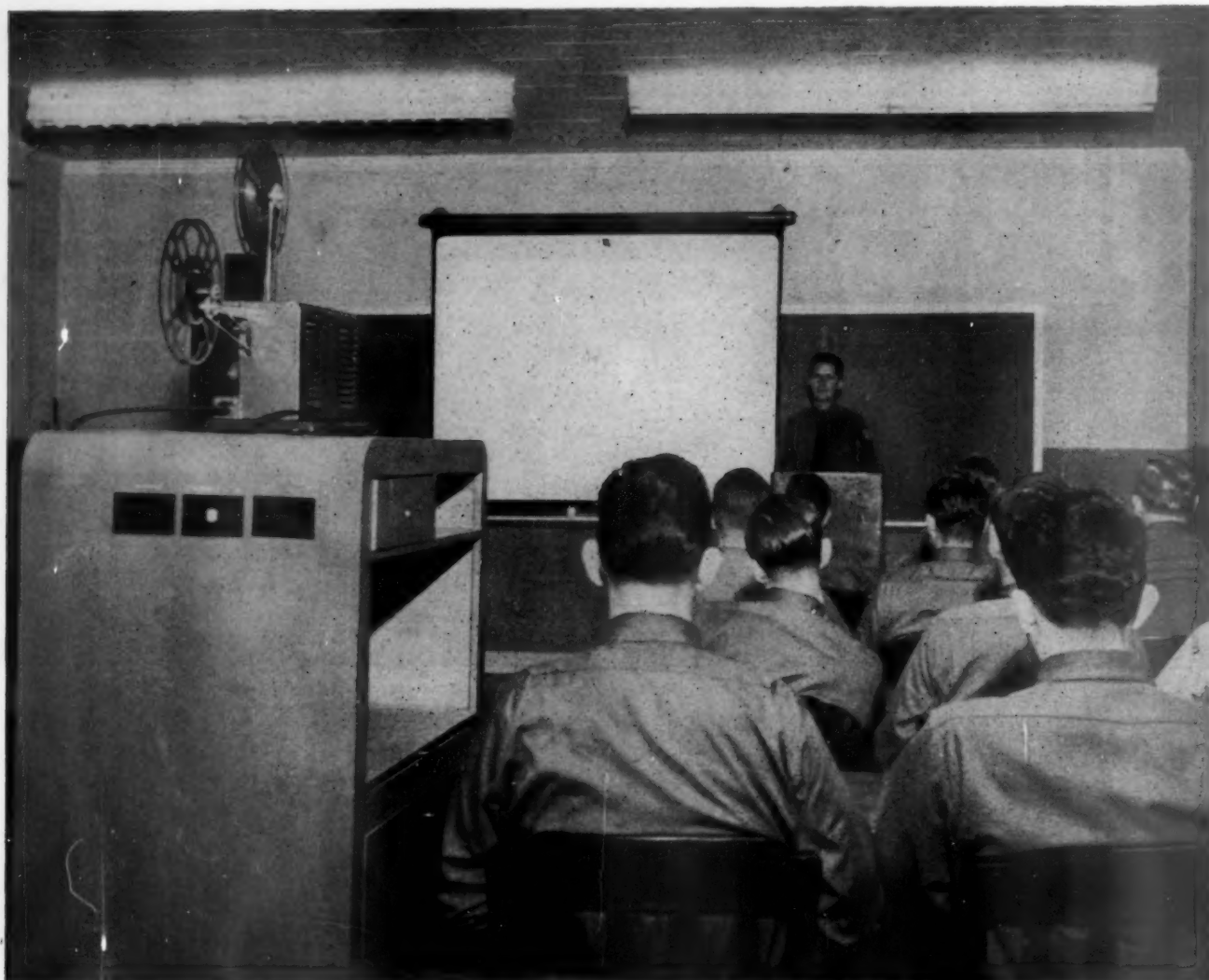
This daily occurrence at the Schiff Training Center is possible because the main classroom building has been planned and completely equipped for the proper use of audio-visual aids.

### A Basic Viewpoint

What is meant by proper use of audio-visual aids in training? It means their complete integration as a tool into the training curriculum, so that they are not considered or used as a thing apart. To the designer of modern classrooms this means one thing: every installation, every piece of equipment, must encourage and emphasize proper use. Projection and viewing equipment must be built into the classroom situation, so that it requires a minimum of handling and delay. Then visual aids can be used most effec-

\* In the 1946 edition of *THE AMERICAN SCHOOL AND UNIVERSITY* an article by Irvine H. Millgate and O. H. Coelln, Jr., entitled *Standards for Visual and Auditory Facilities in New Educational Buildings*, explained in detail the fundamentals of construction. This article is a report of a specific application completed at the beginning of this year.

Some modifications of the original ideas were made for better end results, not because of any inflexible preconceived design of the Mendham building.



Audio-visual aids are an integral part of each classroom in the Boy Scouts' National Training School at Mendham, New Jersey.

tively at the psychological moment. Complete integration does not mean a separate auditorium to which the class must adjourn for a scheduled program, or an improvised ventilation system, or cables stretched along the classroom floor, or loudspeakers perched on desktops. Installations designed as a part of the classroom are unobtrusive yet easy to use at any time. And future developments in audio-visual aids affecting instruction techniques should be accommodated easily.

#### Theory Into Practice

Joint efforts of the Engineering and Visual Education Services, National Council, the Comprehensive Service Corporation (motion picture equipment), and Aymar Embury, consulting architect, working concurrently, brought about the integration of audio-visual equipment into the Mendham Center. Just as the large picture windows were insisted upon in the original plans, so was the design of the lecterns, projection booths, and loudspeakers specified at the very

beginning to insure the flexibility and informality necessary for the proper function of the building.

Educational and fellowship areas of the Schiff Scout Training Center are a combination lounge-auditorium with a capacity of 150 persons, a dining room for the same number, two classrooms, and a smaller fellowship lounge. Since more than one group is usually being "processed" at a time, these areas must be quickly adaptable to small intimate groups, or to larger formal meetings. They must encourage not only the warm cheerful fellowship for which Scouters are noted, but also the careful, scholarly studies needed for Scout leaders in the modern world.

#### Stationary Equipment

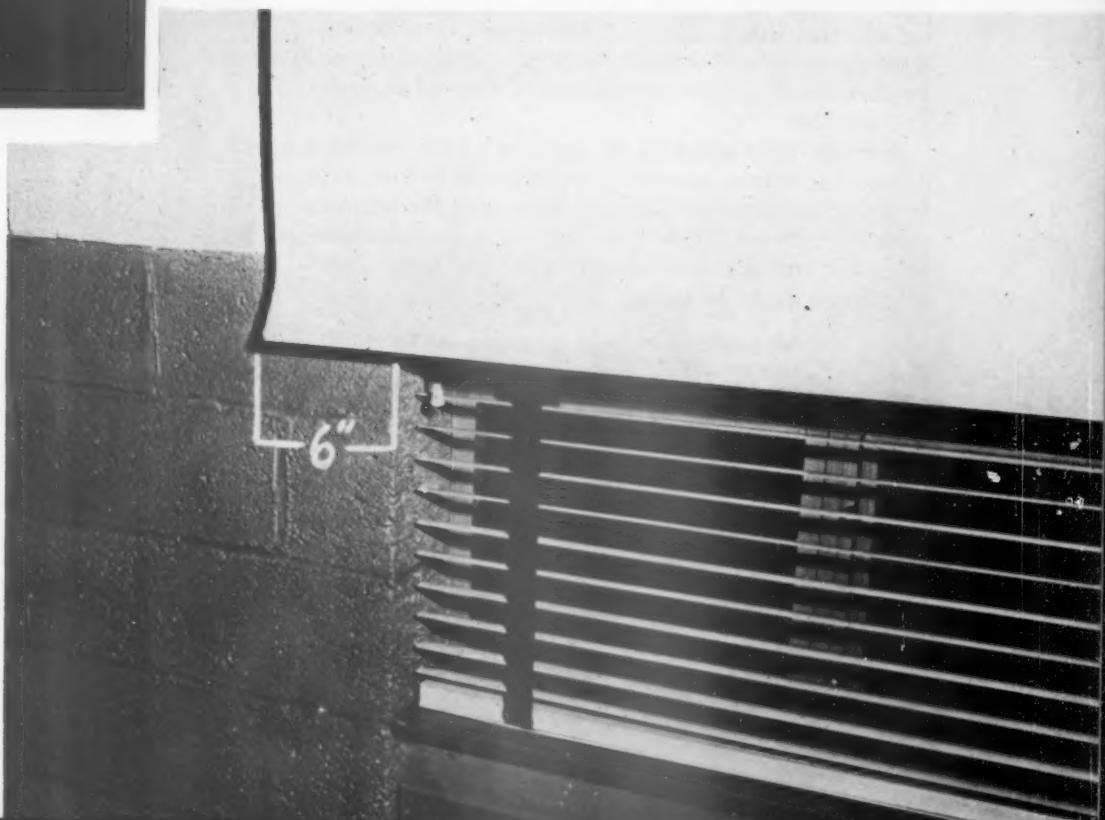
Certain visual aids installations by their nature must be a permanent part of the classroom. A combination of screen, speaker, blackboard, and lectern at the front of the classroom provides an integrated set of tools. Blackout shades are made unobtrusive



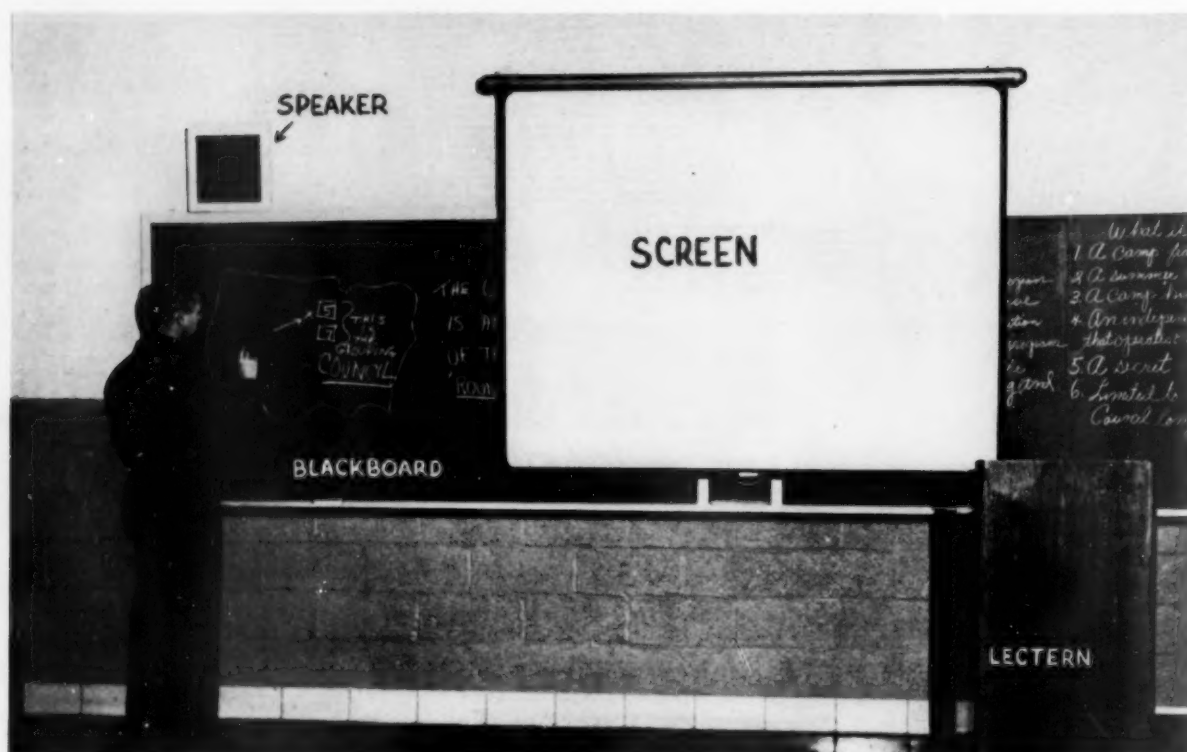
With one quick twist of the wrist, the Instructor can lower the permanently installed blackout shade and darken the room.



Blackout shade is 2 1/2 inches from wall for ventilation and overlaps window about 6 inches to provide complete darkness.







The instructor feels that his blackboard lesson needs audio-visual assistance, and so he has already lowered the screen preparatory to showing a film at the psychological moment.

by omitting the lightbox usually installed to prevent light leakage. They are hung about 2½ inches out from the venetian blinds, and wide enough to overlap the adjacent side walls about six inches. Thus through a combination of blackout shade, venetian blind, and window opening, both proper ventilation and darkness are provided.

A small light recessed in the front wall, centered behind the screen when in use, helps to reduce eyestrain. The faint halo of light cuts down the extreme contrast between light from the screen and darkness around it and also immediately after the house lights are turned on or off.

#### Mobile Classroom Equipment

The lectern for the speaker and the mobile truck, or console, on which the projector stands comprise the main installations. All wiring and conduits are heavy enough to accommodate any possible load now and in the future.

The projector console is mounted on casters so that it can be rolled into place from the storage room before the class begins. It is 4 feet 6 inches high and projects over the heads of the audience who can be

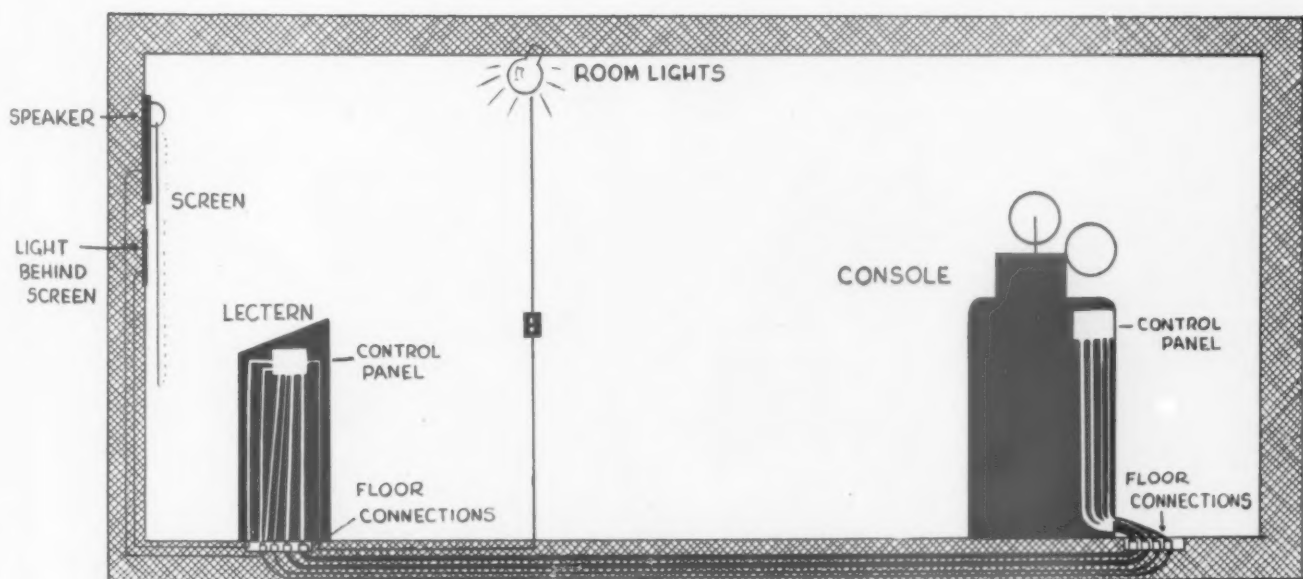


A small light recessed in the wall centered behind the screen makes a faint halo and helps to reduce eyestrain caused by the extreme contrast between the lighted screen and darkened room.





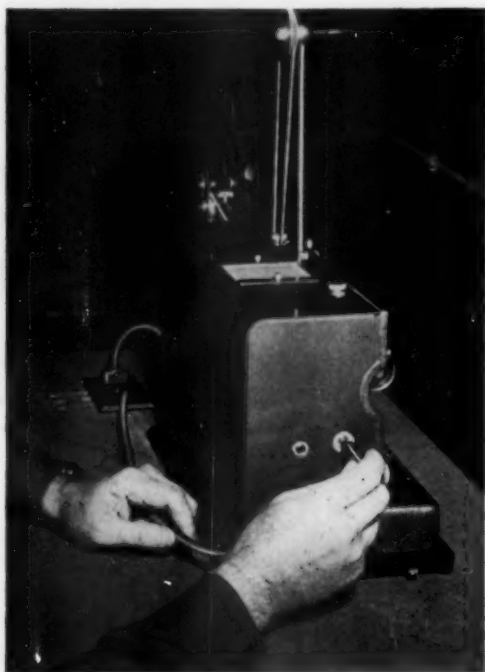
The show goes on. Diagram below shows how lectern for speaker and mobile truck are connected when in action.



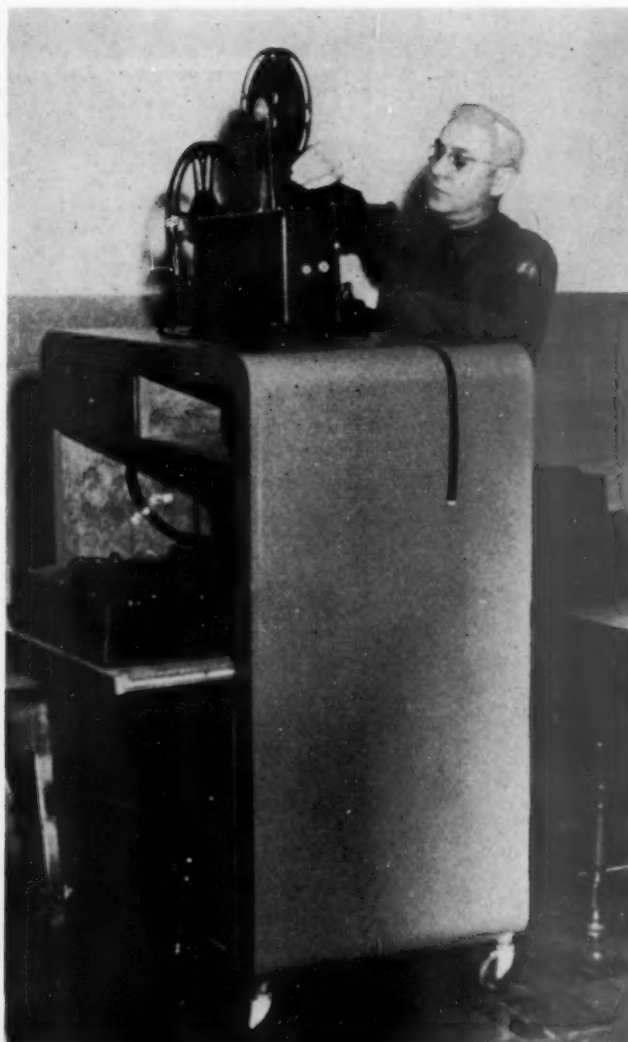
seated directly in front of the projector. Inside the console is space for a turntable, rewind equipment, and storage of extension and adaptor cables, film cans and reels.

The projector is connected with the permanent house wiring through the console. First the control cables from the projector are plugged into matching outlets in the top of the console with special adaptor cables. Then these lines are plugged into the floor panel from the console. They include room lights, remote projector controls, and speaker cord. Matching plugs and panel outlets are painted in the same colors to

Projector console is easily rolled from storage into desired place in classroom and connected with permanent house wiring.



After control cables are plugged into matching outlets in console top, using special adaptor cables, these same lines are plugged into the floor panel from the console.



insure quick and accurate connections. Finally the projector and amplifier are tested and adjusted and room lights checked. All operations can be controlled from the back of the console with the room light switch.

In the front of the room, pre-class preparations are completed by plugging cable lines of the lectern into matching lines of the floor panel, as was done with the projector console. The instructor now may turn off the room lights, turn on the projector and control sound volume from the lectern, without having this equipment interfere with other teaching techniques.

The lectern and the console can be shifted in or out of the classrooms, but duplicate equipment is available if both sets are needed simultaneously. Both rooms are wired and equipped in the same manner. The projector console also may be used for mounting a slide and filmstrip projector with the turntable playing the recorded narration. Since the faculty of the Training Center encourages informality and discussion when showing slides and filmstrips, recorded narration

and the automatic-change type of projector are seldom used. Therefore, a narrator and projectionist are usually needed. Controls to start and stop the projector and the turntable can be operated remotely from the lectern.

A supply room where films are stored, checked and repaired, is handy to the classrooms; another room nearby houses the projector consoles when not in use.

#### Lounge-Auditorium

In the large combination lounge-auditorium, students may meet with the instructor informally, or assemble in groups for an auditorium session. The instructor has at his elbow on the lectern the same remote controls described for the classroom. A floor panel is located at the center of this hall so that the projector console may be used.

However, since larger more formal groups are often seated here, a projection booth is situated in a balcony at the rear of the hall, completely integrated with the architecture of the building. Inside the projection



As part of pre-class preparations, projector is tested and focused, room lights are checked.





Cable lines of the lectern are plugged into matching lines of the floor panel, as was done with the projector console.



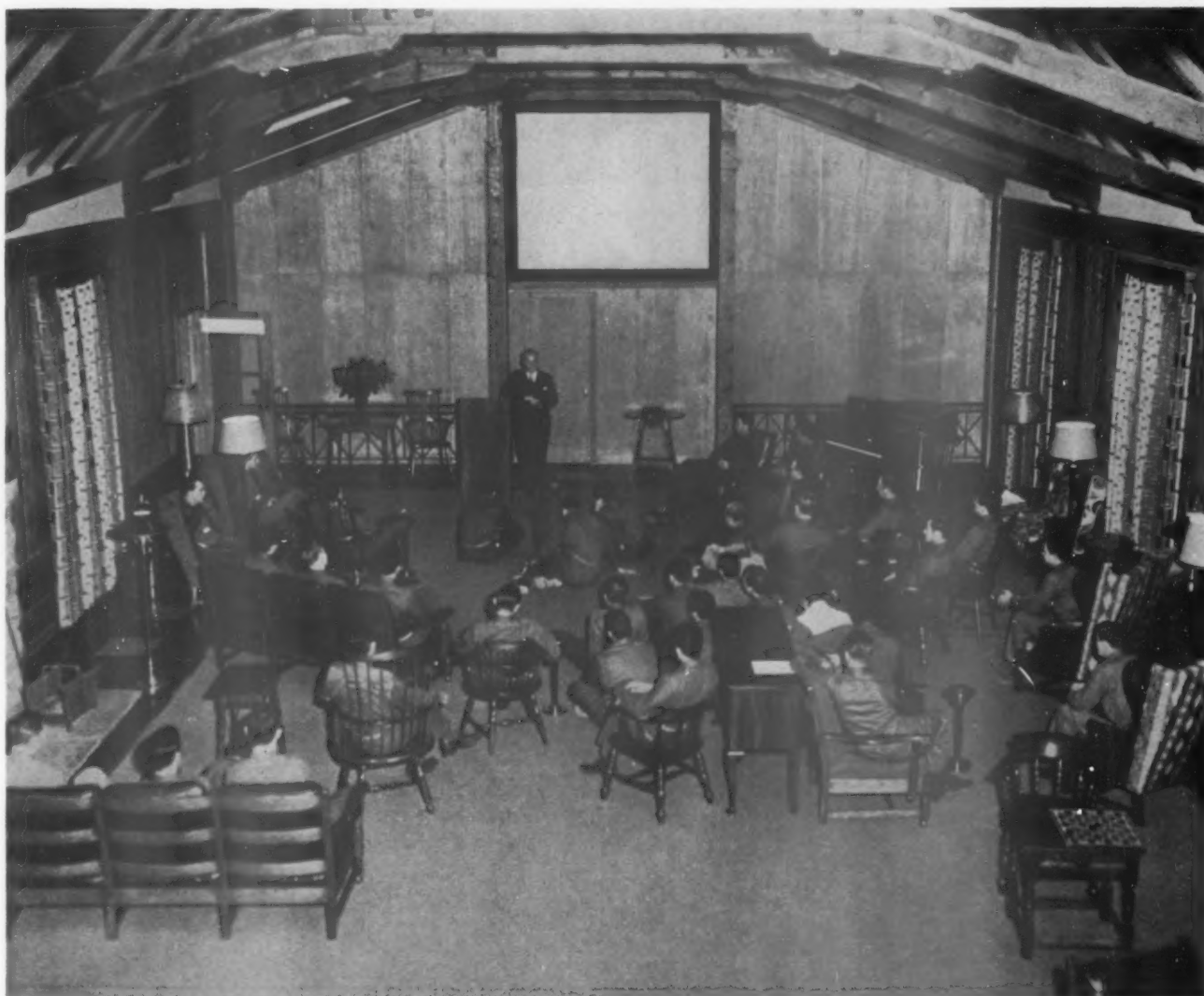
Instructor is now able to turn off room lights, turn on the projector, and control the sound volume from the lectern.



Same projector console is used for mounting a slide and film-strip projector. Turntable plays recorded narration, if any.



Supply and storage room is where films are kept checked and repaired. Central location makes it handy to all classrooms.



Combined auditorium-lounge fosters informal meetings between instructor and students.



Additional control station is located in the center of the auditorium-lounge from which a sound projector may be connected and controlled, as in classrooms.



For larger showings in the auditorium-lounge, a projection booth is situated in the rear balcony.

booth are dual projectors and a monitor control speaker. Besides the usual switches (focus, sound, starting and stopping of the projector) room lights are also controlled here as well as from the lectern at the front of the hall. A clear view of the screen from almost any position behind the projectors is permitted by the elongated portholes.

The projection booth also contains two turntables and a public address control unit. The public address system can be operated from the booth and from a wall panel near the front of the hall. The turntables and the public address system operate through four well placed speakers. When music is being played, all four are used. When the projector is in operation, only the two front speakers are used.

#### **Fellowship Facilities**

Based on the idea that the dining room is a center of fellowship and training, facilities for a public ad-

dress system and projection equipment have also been built into this room. A floor panel is available as well as the public address amplifier and microphone. No remote control system is needed here, because there is no "front of the class" situation. For the same reason, a portable screen is set up when and where needed.

The smaller fellowship lounge is perhaps the best example of the flexibility of all these audio-visual installations. Primarily a lounge for relaxation with a snack-bar and an adjoining library it can be turned into a completely equipped classroom to supplement the other two. The same floor panels, permanent screen, blackout and ventilation arrangements are available as in the previously described classroom, so that the projector console and lectern can be brought in and quickly connected.

For planners and designers of modern educational facilities, this description of the Boy Scouts' Training Center installations can have decided implications.



Booth has dual projectors and monitor control speaker. Room lights may be controlled, also.



Elongated portholes give a clear view of the screen from any position behind the projectors.



Also available are two turntables and a public address unit operable from booth and front hall.





Even the screen has been integrated into the architecture of the building.

No two institutions have the same utilization problems but certain definite steps can be taken in every planning situation. Every administrator should make sure that:

1. A visual aids expert sits in at the very beginning of the planning.
2. The audio-visual aids equipment is completely integrated into the design and architecture of the build-

ing, with adequate storage and repair space provided.

3. The faculty is thoroughly indoctrinated with the philosophy and use of this equipment, so that it is as accepted and as natural as other classroom tools.

4. The contents of existing courses and methods of presentation are re-evaluated to make sure that the investment will pay off in terms of efficiency and dollars and cents.

# THE ELEMENTARY SCHOOL LIBRARY

By **W. GEORGE HAYWARD**

Principal, Elmwood School

and **HENRY E. KENTOPP**

Superintendent of Schools, East Orange, New Jersey



Dr. Kentopp received his B.A. degree at Midland College, Nebraska, his M.A. at the University of Wisconsin, and his Ed.D. at Teachers College, Columbia. From his vantage point as an elementary school principal and later as a school superintendent, Dr. Kentopp has been able to observe and study the development of elementary school libraries from their beginning to that time when they have become an indispensable part of the school program.



Dr. Hayward, who is principal of the Elmwood School in East Orange, New Jersey, received his B.S. degree at Rutgers University and his M.A. and Ed.D. at Columbia. He is also a part time instructor at Lehigh University and has taught at Newark, Paterson, and Montclair State Teachers Colleges at various times since 1937. He is chairman of the New Jersey Education Association's Teacher's Welfare Committee and a member of the State Board of Examiners.

**F**OR three decades, some excellent library rooms have been included in elementary schools. Many of these spacious areas have contained two or three sets of encyclopedias, several hundred sample books, some wall pictures presented by the Parent-Teacher Association, a stuffed owl, and the exhibit of a large oil refinery. An attractive room, the only one in the building representing a major departure from the orthodox, it was the first to be shown to visitors.

## Is It Necessary? Is It Used?

Authorities in elementary education agree almost unanimously that pupils develop best when they have ready access to a large variety of materials, when broad research work is possible on the child's reading

level, and when under the guidance of a wise teacher pupils learn to summarize information, evaluate opinions of various authorities and then organize their own tentative conclusions commensurate with their particular stages of mental maturity.

The type of schoolroom procedure described represents a far cry from textbook memorization. Resourceful teachers now encourage research and evaluation, but these methods cannot become prevalent until a wide variety of suitable learning materials is made available to all pupils with reading ability. In addition to books for research work in social studies, science, health, and other subjects, a long-recognized need for an abundance of recreational reading materials exists. The elementary school must also pro-



vide a place for all other source material, such as mounted pictures, filmstrips, exhibits, special maps, bulletins and clippings. The best elementary school program cannot progress without all these facilities.

We have the definite need for extensive source materials that can be met with the following facilities:

1. Classroom libraries
2. Extension service from centralized city or school libraries
3. A library in each elementary school

We know that the first method is limited by a lack of sufficient funds and space. We have never seen a program based on classroom libraries which did not suffer tremendously from insufficient resources.

An extension service from a centralized library represents an improvement, but it is still far too limited, and should be reserved for supplementary use.

#### Satisfactory Arrangement

The third method is the most feasible plan to furnish pupils who are active in an alert and wide-awake program with the right books at the right time. An ever-expanding centralized library is necessary and possible. It must be attempted in every elementary school.

From the experiences of a number of schools, we know that large funds for additional books, while desirable, are not necessary at the start. Fine libraries

By utilizing the various services of the library these grade school children are broadening their educational experience.





Library Club members of an East Orange, New Jersey, grade school help operate the library.

have had their beginnings when all teachers pooled their resources. Books thus become available to all.

This embryo of the centralized library represents the best possible use of the district's investment in books. Using it as a model, teachers can better demonstrate the value of dynamic pupil research on a significant topic so that the school board and the Parent-Teacher Association will have visible evidence of the need for future expansion. As their understanding of its potentialities increases, so will their eagerness to furnish additional books and equipment. Unfortunately, too many laymen have the notion that libraries merely provide story books (a need which, though important, is often passed off with a shrug of the shoulders in some communities).

The space needed to start an elementary library has no absolute requirements. Excellent libraries can operate in the corridor or from the rear of the auditorium. They can be quite small, merely a dispensary, with actual use of reference books confined to the classroom or home. They may specialize temporarily in reference books only, depending on other facilities for fiction books and supplementary source materials.

#### Proxy Librarians

A trained librarian is very desirable, but not necessary at the outset. Many a principal, supervisor, or

teacher has rendered yeoman service by becoming an authority on library organization and serving with the eager assistance of the pupils' "Library Club."

The important thing is that goals are set up and beginnings, no matter how humble, are established. Pupils, properly trained through apprenticeship, will operate an elementary library in an extremely efficient manner during the absence of the chief supervisor. This pupil responsibility, incidentally, may represent one of the best opportunities the elementary school has for significant development of personality, leadership, and the sense of responsibility so essential for competent citizenship in a democracy.

Many elementary school libraries are not being fully used. However, for every library being poorly used, there is one being used at its maximum. Many more are growing toward the level of desirable usage.

Of course, frustration is inevitable unless the library is incorporated into the learning program. It is hard to say which comes first, the curriculum program which creates the needs to be met by a library program, or vice versa. The curriculum cannot be developed in such a way that a library is an essential part of it if the library does not exist. Neither can the library program function in a situation where the curriculum program is designed so that it is merely limited to the memorization of the books in the class-

room. The answer seems definitely that the two go together and must be built together.

#### **Pupils' Opinion**

The success of a library depends, too, upon the children's attitude. Children do not come to use the library automatically, nor do they respond wholeheartedly to the library through isolated lessons in library skills. They need to grow into it. Many devices and much planning foster desirable growth. For example, first grade children can be taken to the library for "story hour" where they can select books with pictures they enjoy before they learn to read. They can begin to locate pictures about experiences they share with others.

Gradually, as they learn to read, they can be introduced to the organization of the library by being shown where to find certain books. In grades two, three, and four, topic headings in the picture file and the index are explained. When they reach grades five and six, the entire plan of the library, the use of all aids, the indexes, etc., are known, and skill in their use grows.

#### **A Necessary Part**

Plans for elementary schools now should provide a library room at least 50 per cent larger than a classroom. Glass apertures in an adjoining room permit peripheral supervision when pupils are in charge. In this way, teachers or the office secretary can fill in when a full-time librarian is not available, as is so often the case in elementary schools.

There should be a work alcove, which also can be supervised, with the best lighting, ventilation, and

acoustical treatment included. Tables, bookcases, indexes, charging desk should be child-scaled. School architects have made great strides in this direction during recent years.

All equipment should be movable so that changes may be made in the organization of the library as the program develops. An upholstered, built-in window seat will add informality and be the most popular place in school. The charging desk should be at one end of the room, to concentrate and minimize conversation. A conference room with glass paneling would be helpful for small committees who are making a cooperative research study. When instruction catches up with theory, even more small conference rooms will be needed and the present floor plan should permit these future developments. Modern school buildings will probably be used a hundred years, and flexibility takes on special importance.

If the library is designed properly, it can serve as a classroom in an emergency. This was done in the unique North Haven, Connecticut, school developed by Douglas Orr. A library close to the upper and middle grades has its advantages from the reference book standpoint. When it also serves the community, it is better located near the main entrance or provided with an entrance of its own.

Architects deserve commendation for their refreshing innovations in designing library rooms. Now friendlier and more inviting, they are no longer standardized and institutional. The library has gone through the pains of natural growth which seem to take place when a staff and children make it a must in the modern program of elementary education. All now take pride in it, and all attest to its worth.

# A TEACHING AIDS LABORATORY

By **NORMAN WOELFEL**

**Professor of Education—Director of Teaching Aids Laboratory  
Bureau of Educational Research, Ohio State University, Columbus**

**S**INCE the war the use of audio-visual materials and techniques in college and university teaching has increased tremendously. This increase has been due to two major factors—their ready availability, and the fact that so many college teachers while serving with the armed forces became familiar with audio-visual aids.

Certainly the higher education teaching pattern in the United States is undergoing a major change with the impact of radio, recordings, television, motion pictures, colored slides, filmstrips, new types of projectors, new styles in charts, graphs and maps, and much highly specialized teaching equipment. This accelerating change is taking place not only in physical education and specialized professional and vocational areas, but also in departments where any departure from the formal lecture, textbook assignment, and oral quiz methods of teaching formerly has been looked upon as revolutionary!

## **Demand for Instructional Help**

College and university administrative offices have consequently been confronted with pressing demands from instructors for easier access to better teaching facilities and materials. A general survey and inventory of existing audio-visual facilities and the appointment of a college or university committee to recommend a university policy has been the usual response.

These special committees have, of course, brought in many varied reports on the existing situation and



Dr. Woelfel, who has been Professor of Education and Director of the Teaching Aids Laboratory of the Bureau of Educational Research at Ohio State University since 1943, received B.A., M.A., and Ph.D. degrees at Columbia. He was co-founder and editor of "The Social Frontier" and has written several books on education. From 1937 to 1943 he was Associate Director on a General Education Board research project in radio for Ohio State—Evaluation of School Broadcasts.

many varied recommendations for action. Every local situation is different and calls for careful investigation in terms of past history and future plans.

In larger universities the special committee usually finds that a modicum of teaching aid service already exists on a campus-wide basis, and that several professional departments and schools have fairly well developed facilities such as projectors and film and slide collections. In these cases the committee is confronted with departmental reluctance for further centralization of teaching aid service. It must decide when to centralize and when to decentralize.

Here again the decision depends upon several factors: frequency of need; equipment and materials available; and financial resources. The objective is always to get maximum educational value at minimum cost. Thus, complete centralization is not always best educationally although it may be the cheapest. Optimum balance between centralization and departmentalization should be the aim.



In many smaller colleges and universities little or nothing has been done toward collecting or facilitating the use of various aids in teaching, except by individual professors. A recommendation to establish a campus-wide teaching aids setup is easier to carry out. Stephens College, Columbia, Missouri, is an excellent example of how a well integrated campus-wide service developed with that college's tremendous emphasis on effective student-centered teaching.

Any midwestern state university would be a good example of the complicated problems involved in moving from exclusive departmental interests to a campus-wide concern for the best possible teaching on every level and in every course. Every one of these universities is attempting in its own way and in the light of its own peculiar educational history to integrate and facilitate teaching aid services. The objective in each case is the same—to enable any teacher in any course to obtain what he needs in the way of films, filmstrips, slides, charts, maps, graphs, recordings, models, apparatus, etc., for more effective teaching.

#### Teaching Aids at Ohio State University

Many departments of Ohio State University during the past have been especially noteworthy for unique and important contributions to teaching materials and teaching techniques in various fields of professional and higher education. Teaching films, silent and sound, and black-and-white and color, have been produced by the Photography Department for colleges and departments on the campus. Techniques in treating teeth have been photographed for the College of Dentistry; digestive processes in animals for the Veterinary College; human developmental stages for the Psychology Department; structure and function of metals for the Department of Metallurgy; operative practices in the hospital for the College of Medicine; techniques in the care of patients for the School of Nursing; problems in painting and sculpture for the School of Fine Arts; and techniques of teaching visual hearing for the Speech Department.

These aids to teaching and understanding are by no means limited to motion pictures. Nearly every department on the campus also has developed extensive collections of colored and black-and-white lantern slides for classroom projection purposes.

Laboratories in physics, chemistry, engineering, agriculture, mechanical drawing, and architecture have developed extensive pieces of three-dimensional equipment to help students build basic understandings. The Colleges of Law, Arts and Sciences, Commerce, and Education all have been interested in organizing special experimental units to improve instruction which have involved practical work in these four fields.

The Department of Agricultural Extension for many years has used the very latest and most effective devices for teaching Ohio farmers scientific techniques in agriculture. The Department of Agricultural Extension, the Department of Zoology and Entomology, and the College of Medicine have employed tech-

nicians to design and execute instructional charts, graphs, and maps for educational and publicity purposes. Geology and geography are undertaking a number of objective projects to improve instruction in those departments.

Home economics, social administration, bacteriology, ceramics, music, and special and adult education—in fact, almost all departments—have been deeply interested in these new techniques and materials.

#### Problems of the Teaching Aids Laboratory

The Teaching Aids Laboratory, set up in 1943 by the College of Education as its service agency in the teaching aids field, had by 1945 taken on certain campus-wide functions. Departments of the university which had not previously used motion pictures or recordings found some useful items of this type at the laboratory. Departments contemplating purchase of audio-visual equipment consulted with the laboratory staff about "best buys." The university administration granted the laboratory's request for funds to remodel a large basement room into a high-fidelity recording studio to be run on a campus-wide service basis under laboratory direction. Because there was some difference of opinion among university staff members regarding this arrangement, the university's Committee on Motion Pictures was asked to investigate and make recommendations.

As a result, this old and considerably specialized committee was enlarged, its name was changed to the Committee on Audio-Visual Materials, and its jurisdiction extended to cover general university policy-making with respect to instructional services. Under the chairmanship of Edgar Dale, an audio-visual expert, the committee includes the director of the Teaching Aids Laboratory, the chairman of the Department of Photography, the director of the Department of Laboratory Supplies, and representatives from three or four teaching departments. The Teaching Aids Laboratory, at the request of this committee, issued the following circular early in 1946 to all university staff members.

#### Information about Campus Instructional Aids Services

The Committee on Audio-Visual Teaching Materials has the responsibility of facilitating the use of many types of teaching aids in various subject fields. We call your attention to the following services already available from existing departmental agencies. *All services are free unless otherwise noted.*

##### Motion Pictures

1. *The Teaching Aids Laboratory* in Page Hall is a central source of information about and availability of motion pictures in all subject fields.

2. *Production of Educational Motion Pictures:* The Department of Photography in Brown Hall will produce instructional films for departmental use. Apply for special announcement issued by the Department of Photography.

3. *Motion Picture Film Storage and Repair:* The Department of Photography in connection with its film library provides a repair and reconditioning service on all types of motion picture films used in university work.

*Audio-Visual Equipment*

4. *Operation of Audio-Visual Equipment* (projectors of all types): Trained student operators are on call at the Teaching Aids Laboratory, Page Hall.

5. *Loans of Audio-Visual Equipment*: A university pool of larger and more expensive projectors is being developed. Meanwhile, a limited supply of sound and silent motion picture projectors, slide and slidefilm projectors, and record players is available for loan to any university instructor by arrangement with the Teaching Aids Laboratory.

6. *Repair and Servicing of Audio-Visual Equipment* (motion picture projectors, slide projectors, filmstrip projectors, phonographs, recorders, public address systems, radios, etc.): A special repair shop is maintained at the Department of Laboratory Supplies in the Chemistry Building. Departmental equipment will be picked up, repaired, and returned.

*Glass Slides and Photographs*

7. Standard (3¼-inch by 4-inch) and 2-inch by 2-inch glass slides in black-and-white and in color, as well as finished photographs of any size and subject desired for instructional purposes, are available by requisition to the Department of Photography, Brown Hall.

*Recordings*

8. *Recording Service*: A large new recording studio for the use of all departments of the university has been made available in Derby Hall. Expert technicians are available to assist in any type of recording project of a service, instructional, or research nature. Call the Teaching Aids Laboratory, Page Hall.

9. *Educational Recordings*: A large library of reference recordings, covering many university subject-matter fields, is maintained at the Teaching Aids Laboratory in Page Hall. Records and record-playing equipment are available for loan to all departments.

*Instructional Charts, Graphs, Posters, and Exhibits*

10. A special studio for the preparation of instructional material of this type is maintained in Hut 1236. Call the Teaching Aids Laboratory.

*Laboratory Apparatus*

11. The Department of Laboratory Supplies in the Chemistry Building maintains a central university stockpile of varied laboratory equipment available for loan to any department. Glass-blowing services are also available from this department.

*Mimeographing and Printing*

12. All types of mimeographing and duplicating services are available by request to the University Mimeographing Service, Journalism Building. All types of printing services are available by requisition to the University Print Shop in the Journalism Building.

*Instructional and Office Supplies*

13. The University Stores and Receiving Office in the Service Building maintains a stock of many types of office and classroom items available by departmental requisition.

*General Services*

14. The University Service Department in the Service Building will provide all special services needed by instructors, such as specially designed classroom equipment or construction projects involving electrical, mechanical, and woodworking skills.

This circular shows the variety of services to instructors which a large university is able to offer as well as the scattered and unintegrated nature of them. Most of the agencies named have highly specialized

and varied functions related only slightly to classroom teaching. Each agency is concerned with its own efficiency and with its own method of operation. Each has had more work thrust upon it in recent years without correlative allotment of additional space or personnel, and is therefore not particularly eager to multiply the applications for service which come to it.

The audio-visual materials committee has not attempted to integrate these varied service agencies at once. Instead it is seeking to publicize existing services and to increase instructors' demands for them in the hope that the agencies in turn will call for a reconsideration of university policy. The committee has initiated special university-wide projects, such as a recently released motion picture made by the Department of Photography dealing with university instruction. It is actively supporting the efforts of the Teaching Aids Laboratory to extend and multiply free services to all classroom instructors, and it also assists the Purchasing Department in rationalizing departmental purchases of all audio-visual equipment.

*Staffing and Housing the Laboratory*

The Teaching Aids Laboratory now operates as the major campus-wide service agency in the audio-visual field; its services to classroom instructors are free. As already indicated, all policies of this laboratory are cleared through the university audio-visual materials committee appointed by the President. The laboratory is administered through the Bureau of Educational Research of the College of Education. A large part of the bureau's budget is allocated to salaries and purchases of laboratory equipment and materials. The laboratory is also allotted a small share of the annual university appropriation earmarked for departmental equipment purchases. This is used to purchase new titles for the general film library operated by the laboratory and new audio-visual equipment items for its central equipment pool.

The film library is one of a number maintained by university departments and the central audio-visual equipment pool is a very small fraction of the total inventory of audio-visual items owned by the university and allocated to departments.

The Teaching Aids Laboratory is administered by a full-time director of professorial rank and staffed by several full-time professional and technical men and women and a number of part-time students. The present staff assignments are as follows:

1. Administrative Office and Information Center Service: one full-time director; one full-time secretary; regular staff members as needed.

2. Equipment Loan and Projection Schedule Service: one full-time professional educator; one full-time clerical assistant; ten to twelve part-time student workers.

3. Service and Maintenance of Equipment Pool and Film Library: one full-time technical worker; one part-time student worker.

4. Recording Service: two full-time technical workers.

5. Chart and Graph Service: one full-time technical artist; three to six part-time student artists.



Control room and recording studio are housed in basement of centrally located classroom building.

Recording studio is equipped with high-fidelity recording and playback equipment.



6. Recordings Library: one half-time librarian.  
7. Curriculum Materials Library and Workshop: one full-time professional educator; one half-time student worker.

The Administrative Office, Information Center Service, Equipment Loan and Schedule Service, Recordings Library, and Curriculum Workshop are maintained in a suite of rooms in the basement of the Law School Building. Space allotments of the various ser-

vices of the laboratory, though at present inadequate, are approximately as follows:

	<i>Feet</i>
Reception Room and Information Center	36 by 27
Director's Office	18 by 15
Schedule Office	36 by 18
Recordings Library	18 by 12
Four Faculty and Student Listening Cubicles	4 by 4
Equipment Room and Film Library	18 by 12



Curriculum Workshop	36 by 21
Curriculum Workshop Consultation Room	18 by 12
Preview and Demonstration Classroom (seating capacity 40)	34 by 15
Experimental Photographic Laboratory	9 by 6

The recording service is maintained in a special studio suite in the basement of a centrally located classroom building. This suite consists of a large studio 33 feet by 20 feet, a small studio 10 feet by 5 feet, a control room 30 feet by 14 feet, an office 8 feet square, a machine shop 10 feet by 30 feet and an observation balcony 33 feet by 6 feet. Special wire connections with the university radio station and all buildings requiring remote recording pickups have been installed. This studio is equipped with high-fidelity disc-recording and playback equipment and will soon have high-fidelity tape equipment.

The chart and graph service is maintained in one of the centrally located war surplus huts (60 feet by 20 feet). This studio was completely equipped with furniture and other equipment items from existing university inventory stocks. Almost any type of classroom chart or graph, or three-dimensional exhibit material, can be produced within a week of the order.

In addition to these space allotments the laboratory has complete control over one large classroom which, like the small preview and demonstration classrooms near its administrative office, is equipped with still and motion picture projectors, transcription turntables, and special darkening facilities.

#### Teaching Aids Laboratory Services

The Teaching Aids Laboratory adjusts its services to the needs of departments, instructors, and student teachers to aid them in solving instructional problems. These may range from special issues in building planning to scheduling some university class for a film showing. As time permits between consultations and routine scheduling, various laboratory staff members prepare short informative bulletins on instructional aids. Special demonstrations of teaching equipment and teaching resources are frequently arranged for various departments.

Funds for the laboratory services have been limited, however, and neither present personnel nor the present equipment pool permits bringing services to the level of actual campus needs. The laboratory is immediately concerned with evaluating its policies and types of service by specific reports from department chairmen on which depend extension or contraction of its operations.

Faculty demand for the film-booking and film-projection services of the laboratory continued to increase steadily during the last four years. Two projection rooms controlled by the laboratory are used almost continuously during the day, and frequently are scheduled for evening classes and group meetings. Projection facilities all over the campus have been improved, especially in several of the cam-

pus auditoriums where additional equipment was installed. Steadily increasing amounts of sound and projection equipment are loaned to faculty members for classroom use and the film library is being augmented continually.

Instructional departments seem to prefer operation of projection equipment by part-time student operators whose services are scheduled by the laboratory rather than by classroom instructors.

#### Recording Service

The university recording studio during the past year has undertaken and completed the following projects directly related to classroom instruction:

1. Pre-course and post-course recordings for all students in elementary speech classes
2. Three series of special recordings for use in Spanish and French language classes
3. One series of recordings for drama classes
4. Transcriptions of radio programs for agricultural extension, education, medicine, music, fine arts, home economics, and speech
5. A series of remote pickups from classrooms and auditoriums for the Department of Business Organization.

The studio prepared extensive sets of recorded proceedings of the university's 75th anniversary conferences for the University Archives. It also assisted the university radio station by transcribing from the studio, for delayed broadcast, programs such as the *OSU Forum*, *Economically Speaking*, *Book Review*, *Beginning French*, *Once upon a Campus*, *What's New*, and *Campus Visitor*.

The studio was used extensively for special auditions, dramatic rehearsals, and live broadcasts. In addition to direct transcriptions of programs, the technical staff copied tape recordings made in campus classrooms on discs.

Four high-fidelity record players for group listening were designed and constructed by the studio staff and are now used in laboratory listening rooms. The studio staff occupies its non-scheduled time on technical projects for studio improvement.

#### Recordings Library

The recordings library had the most active quarter of its existence in the spring of 1949 when many more faculty members and students than ever before borrowed recordings and players. French and Spanish recordings prepared in the studio for the Romance Languages Department have had very heavy use by students. In preparation for other language departments that adopt the same technique, plans are under way to expand student listening facilities.

The recordings library now has available nearly 6,000 recordings of all types. Others are being added by purchase from commercial companies, gifts from radio stations, and off-the-air recordings by the studio. Lists of recordings in special subject areas are made on request of faculty members.





Projection equipment is inspected periodically.

#### Chart and Graph Service

The university chart and graph service operates to serve the various campus departments and agencies. Extensive sets of large charts for classroom use have been made during the present year for journalism, agriculture, horticulture and forestry, Reserve Officers' Training Corps, home economics, pharmacy, education, botany, dairy husbandry, dentistry, mechanical engineering, civil engineering, occupational therapy, and commerce. Classroom material is given priority, and artists work in close cooperation with instructors in preparing chart layouts.

As time permits, various other services are provided when campus agencies ask for them. Among those completed during the past year were chart reproductions for psychology texts; illustrations for articles and pamphlets; sign and display work for the Department of Public Relations, School of Fine Arts, Department of Geology, and Alumni Office; original drawings and titles for filmstrips and motion pictures for education, industrial engineering, and photography; and drawings for lantern slides for agricultural education and physics.

Flat and three-dimensional exhibits have been designed and executed for the College of Medicine, College of Pharmacy, Reserve Officers' Training Corps, School of Social Administration, the Bureau of

Public Relations. A weekly bulletin board of educational materials on the first floor of the College of Education building is designed and maintained by artists from the chart and graph service.

#### Curriculum Materials Workshop and Library

The Teaching Aids Laboratory received so many applications for materials from student teachers in the College of Education that a small office has been set aside to collect filmstrips, slides, flat pictures, charts, maps, pamphlets, and fugitive materials useful for practice-teaching in city and county schools. Although almost no funds were available when this service began three years ago, a sizable collection of such loanable materials was obtained largely from free sources. The service has proved such a boon to practice teachers that the College of Education has promised substantial financial support.

Under the direction of an able supervisor, students evaluate, mount, classify, and file materials as they come in from industrial establishments, educational publishers, and local community sources. Frequently special Education classes are scheduled with the curriculum workshop supervisor for a demonstration in simple techniques of mounting, filing, storing, and constructing classroom teaching aids.

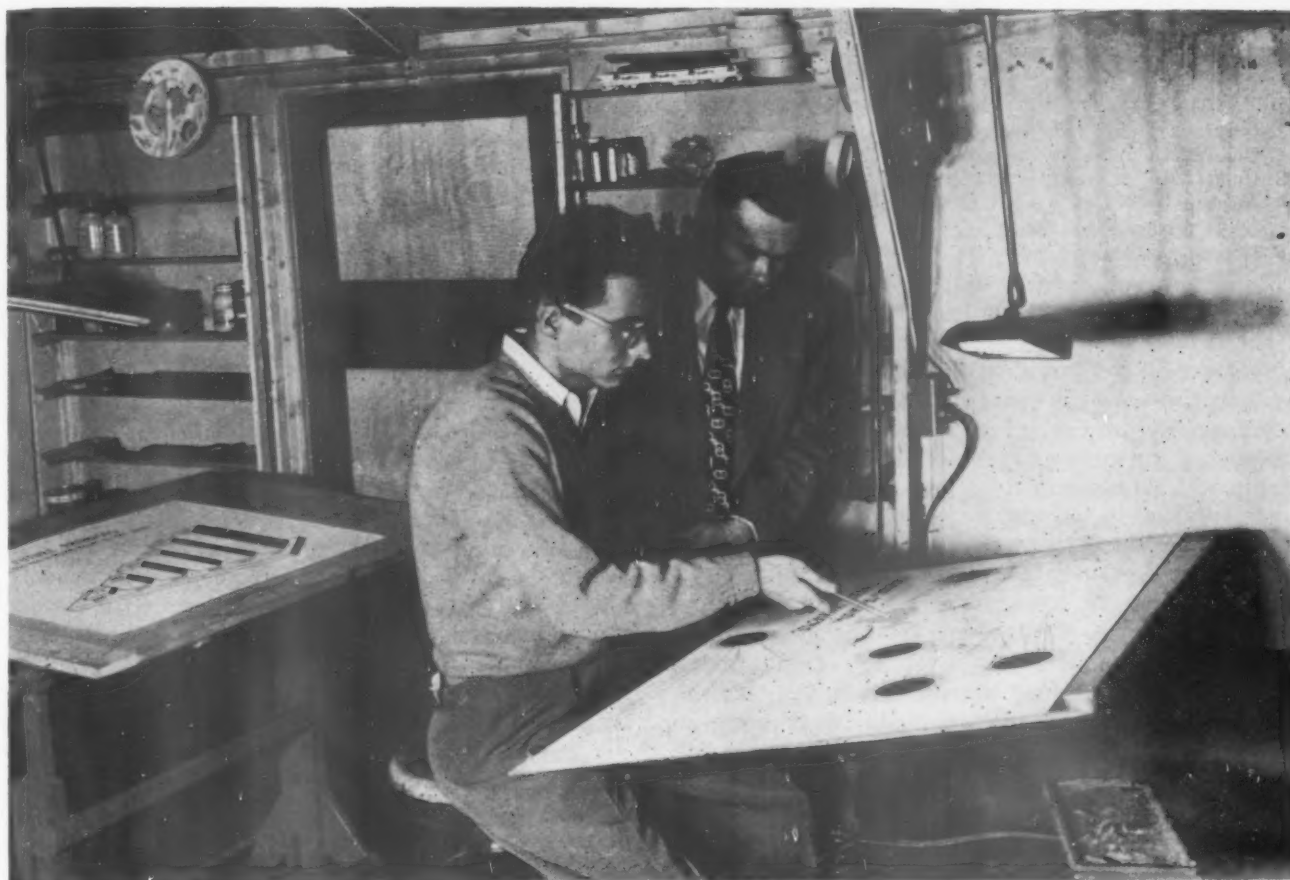
#### Publishing Activities

Staff members of the laboratory work cooperatively on a series of periodic bulletins dealing with teaching equipment, techniques, and materials. These publications are undertaken in response to needs expressed by faculty members or by elementary and secondary school administrators and teachers in service. The following titles of those published and distributed during 1949 indicate their diversity:

- Manchester, Alice W., *Recordings of Stories, Rhymes, and Songs for Children and Young People*, October 1949, 18 pp. (mimeographed)
- Williams, Catharine, *The Flannelgraph*, May 1945, 5 pp. (mimeographed)
- Williams, Catharine, *Source Materials for Building Global Concepts*, July 1949, 17 pp. (mimeographed)
- Williams, Catharine, *Starting A School Picture Collection on a Small Budget*, June 1949, 6 pp. (mimeographed)
- Woelfel, Norman, *How to Start a Teaching Aids Program*, February 1949, 7 pp. (mimeographed)
- Bennett, Edward, *How to Keep Your Bulletin Board Alive*, November 1949, 6 pp. (mimeographed)

#### Development of Future Policy

Our Teaching Aids Laboratory is but one example of efforts now being made in practically all universities and colleges to improve teaching by making modern tools more easily available to the entire instructional staff. Undoubtedly many patterns will emerge as experimentation continues. The ideal pattern involving just the right amounts of centralization and departmentalization of services as yet does not exist. In 1947 the writer made brief visits to three large midwestern universities to gain insight into their



Artists and instructors in chart and graph service work cooperatively to prepare chart layouts.

distinctive approaches to this problem. The outstanding characteristics of the audio-visual program in these three centers were as follows:

#### *Institution A*

1. Administration of all motion picture and still photography production by the Audio-Visual Service Center
2. Administration of a recording studio on a university-wide service basis
3. Centralized scheduling of classroom projection service
4. Increasing centralization of audio-visual equipment
5. Faculty previewing and selection of educational motion pictures
6. Provision for specialized training in the audio-visual field by means of courses in specialized areas
7. Elaborate accounting system on production costs.

#### *Institution B*

1. Complete centralization of purchasing and maintenance of all audio-visual equipment
2. Administration of motion picture and still photography production by the Audio-Visual Service Center
3. Statewide consultation and demonstration service to local schools on instructional aids
4. Maintenance of a completely equipped audio-visual demonstration room for classes, university departments, and individual students
5. Responsibility for teaching all audio-visual courses
6. Carrying on of a research program in the audio-visual field.

#### *Institution C*

1. Administration of motion picture and still photography production service by the Audio-Visual Service Center

2. Responsibility for weekly campus-wide showing of latest motion picture news releases and educational features

3. Centralization of campus-wide audio-visual services on a fee basis

4. Gradual approach toward centralized purchase and maintenance of audio-visual equipment

5. Responsibility for courses in the audio-visual field

6. Film previewing service for college and departments

7. Maintenance of an experimental recording studio

8. Recent appointment of a faculty-wide policy-making committee in this field.

In attempting to measure the Ohio State University teaching service enterprises against observations in similar institutions, certain superiorities and apparent inferiorities appeared. Since these may contribute to the development of fundamental principles in services for a large university, they are presented as follows:

#### **Superior Aspects in Institutions A, B, and C**

1. Greater centralization of the various campus teaching aids services

2. More consistent policy with respect to costs to colleges and departments of various teaching aid services

3. Better control of purchasing with respect to new audio-visual equipment

4. Centralized storage, loan, and service facilities for all university-owned films

5. More graduate student assistantships in the audio-visual field

6. Better programs of courses in the audio-visual field

7. Better provisions for demonstration and display of audio-visual equipment and materials.

#### Superior Aspects at Ohio State

1. Centralized university recording studio services
2. Centralized university recordings library
3. Centralized university chart and graph service
4. More extensive university subsidy of basic audio-visual services to faculty members
5. Higher academic standing of audio-visual service staff members.

The crucial point for large universities in this matter centers on the president's vision and insight. In every institution some departments and schools within the university are developing teaching aids personnel, equipment, and services so rapidly that there is serious danger of imbalance in the expenditure of university funds. But every teaching department no matter how large or how small should have the personnel, equipment, and materials it needs to teach successfully.

Because some departments do not seem to require various teaching aids at the present time, the university administration should not fail to provide proper university-wide teaching aids services. A central teaching aids center to supervise all expenditures in the interest of the entire university instructional program is the only solution. Undoubtedly certain large departments will need their own distinctive teaching aids centers, but unless such centers are clearly inte-

grated with a central audio-visual center a tremendous amount of unwise spending and unnecessary duplication of personnel, equipment, and materials will ensue.

Deciding the degree of centralization and decentralization in campus teaching aids services is a knotty problem. Its complexities are multiplied because there are apparently as many degrees of need for teaching aids as there are college and university instructors. The university teacher who is wise to the possibilities of films, slides, charts, models, and recordings is eager to have a complete supply near at hand. He would like to have his own standby artist, his own carpenter and mechanic, his own projection machines, and his own recorders. He will tend to be skeptical of any attempt by university authorities to establish a central agency which takes orders and dispenses these services and materials on a share-alike basis.

On the other hand the professor who is content to lecture day after day without recourse to any teaching aids is completely blind and uninterested regarding university policy on teaching aids services. Yet obviously his interests must be protected against the day when he or his successor finds it necessary to use teaching aids.

#### Are We Dealing with a Passing Fad?

Some persons assume that as soon as the memories of the Armed Services Instructional Program during

Curriculum materials center collects all teaching aids equipment used for practice-teaching.





World War II fades, so will the professor's interest in something beyond the traditional lecture method of teaching his college classes. Others are greatly concerned that the use of charts, illustrative material, motion pictures and slides will be overdone and thus lessen the dignity and seriousness of university instruction. If so, the present scale of expenditures for teaching aid purposes on American college campuses should be greatly curtailed.

We are living in an era when 89 per cent of American parents wish to send their children to college. Reliable tests given to adequate samples of American young people show that one-half of them have the ability to complete two years of college, one-third of them to graduate from colleges as they are now constituted. Actually only a relatively small fraction of our young people capable of higher learning have the real opportunity today of obtaining it.

Our society has reached a crossroads that points one way to destruction of democratic hopes and a high mass culture and the other way to everlasting creative expansion of civilizing influences. Technically, we have become dependent upon ever more complicated machinery of research, production, and distribution.

How can we instruct the coming generations of youth to master those social and technical understandings and tools for democratic salvation? The state is committed to expand educational facilities in its own defense. And higher education, already too big

for some sensitive souls to contemplate serenely, must become ever bigger, approaching the universality of elementary and secondary schools.

Meanwhile the human sciences have verified the essential wisdom of classical insights into the learning process. We realize more universally every day that human beings learn only as they act with their whole bodies and souls. The ultimate learning experience is life itself in all its reality and complexity, rather than a cloister furnished richly with symbols of life. The end of learning is more of the same, and the only inducements that learning can offer are the thrills and excitements of the process. The teacher, on every level, must take his cue from these basic facts—the best teacher is never more than an expert guide. He assists in planning real and vicarious experiences for learners. From the residue of these experiences they gain a desire and growing ability for planning their own lives to meet problems of their culture.

Institutionalized learning must therefore increasingly approach outside conditions for which learners are being prepared. This means the acquisition and wise utilization of every aid to learning that can be obtained on the college and university level as well as on more elementary levels. Motion pictures, television programs, recordings, enlarged pictures, analytic charts, texts, lectures, planned study trips, and the multitude of aids the modern world provides are approaches to and surrogates for reality. The increasing

Students mount and classify materials coming into curriculum materials center.



frequency of their use is assured wherever real learning is expected from teaching.

In planning ahead in higher education administrators must be concerned with two major factors: effectiveness of the learning process, for without this our society itself cannot survive; and economy in teaching resources, for without this the educational structure will cost more than we can afford to pay. The university administrator with real vision will plan now, in cooperation with his faculty, for economical effectiveness in the teaching processes of his institution.

At this point the issue of providing a centralized teaching aids service begins to take on meaning. The very name by which such a service is known has an important significance also. None of us is concerned

with education of the ear and eye alone, and it is doubtful that using the term "audio-visual" in connection with such a service will promote the best understanding of the nature of the service. Motion pictures, radio, and television are important modern tools and they are of course "audio-visual," but they are by no means adequate in themselves as teaching devices. On the other hand little seems to be gained by glorifying a teaching aids service with such a grandiose title as "Communications Laboratory."

We will do better if we forget the vested rights of the "audio-visual" people and the overly ambitious claims of the "communications" newcomers as we face the fundamental problem of really "serving" our college and university teachers.

# EQUIPMENT SUGGESTIONS FOR SECONDARY GENERAL SCIENCE ROOMS

By A. L. HEIL

IF "general science" were defined uniformly throughout the country, the task of selecting equipment would be somewhat eased. However, the geographical location of the school determines to some extent the content of general science. The local economic and social structure also affects the curriculum of general science. The textbook or manual still influences the subject matter of the general science course. These are a few of the variables encountered when endeavoring to compile lists of recommended, suggested, or required equipment for general science rooms.

In order to understand and evaluate the equipment suggested here, it might be well to review the sources of material used in this compilation. The following possible sources of information were canvassed:

1. Forty-eight State Departments of Education
2. United States Office of Education
3. Boards of Education of cities over 100,000 population throughout each area of the country.
4. Boards of Education of cities throughout the United States having population of 25,000-100,000.
5. Boards of Education of cities throughout the United States with a population of 8000-25,000.
6. Authorities in the field of Science Education
7. Manufacturing concerns and supply houses

Several generalities can be drawn:

1. The lists contain suggested equipment.
2. The lists are compiled for (a) demonstration equipment (b) pupils' experiments equipment (c) equipment obtained locally.
3. Little mention is made of work areas or storage space.
4. Quantity required is, in general, left up to individual preferences.

The following list contains the equipment noted most frequently on the lists studied:

## Suggested Laboratory Equipment for General Science

### Individual Apparatus (for a class of eight)

- 4 Bunsen burners or 4 alcohol lamps, glass, 4 oz.
- 12 ft. rubber tubing for Bunsen burners  $\frac{1}{4}$ " inside diameter, heavy wall, white cloth impression
- 4 ring stands, 3 rings 2", 3" and 4"
- 4 beakers, heat resistant glass, 150 cc.
- 4 beakers, heat resistant glass, 250 cc.
- 12 bottles, wide mouth, 8 oz.
- 4 files, triangular
- 8 glass plates 4" x 6"
- $\frac{1}{2}$  gross test tubes, 6 x  $\frac{5}{8}$ "
- 4 test tube clamps, brass
- 4 test tube brushes, tufted ends
- 4 test tube racks, wood, with drying pins
- 4 thistle tubes, to fit No. 5 rubber stoppers, length 30 cm.
- 4 dishes, evaporating, 75 mm. diameter
- 4 forceps, dissecting
- 4 graduates, cylindrical, graduated up and down 50 cc.
- 4 flasks, 250 cc.
- 4 scalpels, dissecting
- 4 scissors, dissecting
- 12 watch glasses, Syracuse 2"
- 8 needles, dissecting, wooden handles
- 4 magnifiers, tripod
- 4 meter sticks ( $\frac{1}{2}$ ) graded to both mm. and  $\frac{1}{8}$ "
- 4 medicine droppers, pipettes

### Apparatus and Supplies Suggested for General Use by Teachers and Pupils

- 1 magnetic needle
- 1 magnet, U-shape, 6"
- 1 air pump
- 1 air pump plate
- 1 box labels



- 1 hydrometer
- 1 funnel, glass, 75 mm.
- 1 funnel, glass, 125 mm.
- 1 aquarium, enameled metal frame, capacity about 8 gals.
- 1 graduate, cylindrical, 250 cc.
- 1 galvanometer, precision type, jeweled bearings
- 2 lbs. glass tubing outside diameter, 5 mm., 6 mm., 7 mm.
- 1 gasometer tube, 50 cc.
- 1 balance, trip, agate bearings
- 1 flask, distilling, 250 cc.
- 1 barometer, tube 80 cm. long
- 1 barometer, aneroid
- 2 pkgs. filter paper, 125 mm.
- 4 bar magnets, 6"
- 1 electrolysis apparatus
- 4 battery jars, 6" x 8"
- 1 bell jar, open top
- 1 electric bell, 2½"
- 1 blast lamp, gasoline (if gas is not available)
- 1 deflagrating spoon, brass, 15" handle
- 1 calorimeter, polished, 75 mm. x 125 mm.
- 1 set cork borers (6)
- 12 candles, paraffin
- 1 gross corks, assorted
- 1 clamp, condenser, large
- 1 clamp, right angle
- 1 condenser, 12"
- 2 compasses, 25 mm.
- 1 spool wire, copper magnet No. 26
- 1 lb. wire, annunciator copper No. 18
- 1 microscope, compound, fine adjustment with two eyepieces and double nosepiece with two objectives
- 6 doz. microscopic slides (1" x 3", plus ½ oz. cover slips)
- 1 set weights, metric, brass 1 gm.-500 gm.
- 1 motor, St. Louis
- 1 electric magnetic attachment for St. Louis motor

- 1 Washington School collection of rocks and minerals
- 1 osmosis apparatus, simple
- 1 trough, pneumatic, 4" x 7" x 10"
- 4 Petri dishes, 4"
- 2 thermometers, cougle scale, engraved
- 1 set physiology charts
- 1 tuning fork, 256 vib. a sec.
- 1 prism 25 x 75 mm.
- 3 spring balances, double scale, 2000 gr.
- 2 pulleys, single
- 2 pulleys, double
- 1 spatula, horn, 5"
- 1 pump, lift, glass model
- 1 pump, force, glass model
- 1 slated globe
- 1 lb. rubber stoppers, assorted
- 1 ring stand, 3 rings, 2", 3", and 4"
- 12 ft. rubber tubing pure gum ¾"
- maps, weather
- maps, topographic

#### Suggested as Desirable

- 1 mercurial barometer
- 1 germinating box
- 1 set 25 microscopic slides for botany
- 1 gas engine, model
- 1 centrifugal hoop
- 1 color disk
- 1 electric cone heater
- 1 breeding cage
- 1 Audubon bird chart
- 1 set capillary tubes, 7 or 8
- 1 steam engine, model
- 1 rotator
- 1 set 25 microscopic slides for zoology
- 1 set 25 microscopic slides for physiology
- 1 projection lantern
- 1 slide making outfit
- 1 siren disk, brass

# GENERAL PROBLEMS OF LABORATORY DESIGN<sup>1</sup>

By HARRY F. LEWIS

The Institute of Paper Chemistry, Appleton, Wisconsin



HARRY F. LEWIS

Harry F. Lewis has been connected with The Institute of Paper Chemistry almost since its beginning in 1930, joining the staff in April of that year. Since 1933 he has been the dean. In 1948 he worked with the National Research Council rewriting a new edition of its book on the design of college laboratories. That book was published in the early part of 1949.

CHEMICAL laboratory construction during the war naturally centered around the rapidly expanding essential war industries. The amount of such construction was enormous. In most cases the facilities were needed long before they could be built. As a result, normal laboratory construction for instructional purposes had to be by-passed. Now we find ourselves trying to teach a suddenly increased number of students, whose interest in science has been greatly stimulated by war experience, in laboratories and laboratory buildings which should have been increased in size and modernized in facilities years ago.

This increase in numbers has resulted largely from the G. I. Bill. The increase in interest stems in part from the realization of the practical value of scientific training and in part from the science-course requirements in preprofessional courses in medicine and dentistry, etc. Chemistry buildings are full to over-

flowing with students in all courses. The necessity of handling the numbers involved is having a profound influence on the thinking of the staff with regard to improved laboratory design.

## Laboratory Design Has Changed

The report published in 1930 by the National Research Council on the construction and equipment of chemical laboratories<sup>2</sup> reflects rather accurately the best thinking of the time; the laboratories built in the early thirties were constructed in much the manner described in that report. Since the publication of the National Research Council report, there have been many developments adaptable to improved laboratory design and equipment. The testing ground for much laboratory planning has been the many new industrial research laboratories constructed during the last five to ten years where, in general, the conventional laboratory pattern has been discarded in favor of functional design.

A large amount of college construction is currently in the planning stage. The author sent questionnaires to 350 such institutions selected from the 711 colleges and universities listed in the Educational Directory for 1946-47 of the Federal Security Agency, Office of Education. A smaller number of professional schools and teachers colleges were included in the list. The

<sup>1</sup> Reprinted from the July 1947 issue of the *Journal of Chemical Education*.

<sup>2</sup> A report of the National Research Council Committee on the "Construction and Equipment of Chemical Laboratories," The Chemical Foundation, New York, 1930, 340 pages.

schools were not selected at random; almost all the state universities, the large privately endowed universities and liberal arts colleges were approached.

#### Survey Findings

The questionnaires were so worded as to yield information on floor-space plans, approximate cost of construction, and also a breakdown as to new building, extension of present building, and rebuilding of present building. Over 200 questionnaires were returned, and it may be assumed with some certainty that these represented the majority of the institutions having definite building programs. Since less than half of all the institutions were approached, the figures may be accepted as minimum. Whether all this construction results in the form of finished buildings will depend upon a number of unpredictable factors, such as economic conditions during the next five years, cost of construction, and availability of material—both for construction and equipment.

Of the 200 institutions answering the questionnaire, 137 have indicated projected laboratory construction; 58 of this number are planning entirely new chemical laboratories; 28, new general science buildings; 26 are extending current buildings; and 25 are rebuilding and modernizing their present buildings. The estimated cost of this construction approaches \$100 million. There appears to be no favoritism shown for any particular area of the country or type of college or university. For example, there are 46 building projects planned by state colleges and universities, 18 by state teachers colleges, and 60 by privately endowed institutions (many of the liberal arts college type). Sixteen schools not in the above 137 are planning new buildings but are not far enough along with their plans to hazard guesses as to either space or cost.

#### Procedure Is the Same

The steps followed in building a chemical laboratory are pretty much the same regardless of the type of school. A departmental committee is set up to help design the laboratories. In the small colleges this may be the head of the department working alone or with the building committee of the Board of Trustees. The function of the committee is largely concerned with supplying the architect with an accurate listing of the number of students, the types of courses, layout of the laboratories, specific services required, etc.

The site for the building may already have been selected by the buildings and grounds committee of the Board of Trustees and the faculty committee has not too much to say about it. Even if this is the case, the committee should check certain things with regard to the site, such as the nature of the terrain, accessibility to trucking roads, to main lines of service for sewage disposal, gas, water, power, etc.; freedom from vibration, from external fumes, fly ash, dirt, and noise (railroads, main traveled streets with trolley car service); the nearness of the location to other related buildings of the university, such as medical, dental,

and agricultural schools, whose students will be serviced by the chemistry building.

There are classic examples of college laboratories located by trustee building committees in conformity with campus patterns where teaching and research were carried out under real handicaps due to lack of appreciation of some of these external factors. One rather famous building intended for very careful work in analytical research had so much vibration from the street that certain types of work could be done only at night. Another is adjacent to the boiler house stack and when the wind is right and the day warm the unknowns blossom out in all directions.

#### The General Plan

Having selected the site, the next recommendation to be made deals with the general plan of the building. One of the first questions relates to the type of the building. For small schools with small teaching staffs a one-floor building may possess many attractive features such as one centralized stockroom opening into all teaching laboratories, and the grouping of student laboratories, with saving of time and energy by ease of supervision from a safety standpoint.

What should the materials of construction be? How should main service lines be carried to the different locations—in chases, in the outer wall, in the inner walls? Construction of staircases, elevator service, air conditioning for all or a part? In considering the general plan, it is important that the faculty building committee advise the architect as to the probability of the need for expansion in future years and the direction of such expansion. Only in this way can additional space be provided without the disruption of important services. Here it is necessary to consider the expected increase in student enrollment, in staff, and in research operations. As these expand, storage and service facilities must expand likewise.

Also important in considering the general plan is the location of the lecture rooms and recitation rooms with respect to distracting outside noises, such as coal chutes, unloading facilities for express and freight, and probable student gathering places on warm spring days. Likewise in placing research laboratories, libraries, etc., thought should be given to preventing as much distracting inside noise as possible. Balance rooms and laboratories concerned with the use of delicate instruments should be protected from fumes and vibration. If possible, large lecture rooms and first-year laboratories should be on the first floor of the building and provided with relatively direct exits to the outside.

One of the important points commonly neglected in the general planning of a laboratory building has to do with the projected expansion of the library. It should be possible for the faculty building committee to advise the architect with a reasonable degree of certainty both as to the current shelf space requirement for unbound and bound publications and reference books and also as to the probable expansion in feet per year for



new publications and new books. If the building is projected for twenty-year use, library expansion should be set up on that basis. There are many supplemental services associated with the library that seem to come to mind after the plans are drawn and the building is built. These include film reader service, photostat service, carrels for graduate students and faculty.

Of all the rooms in the building, the library room should be the one most adequately provided with comfort facilities, such as adequate lighting, acoustic treatment, and ventilation. One real annoyance in departmental libraries is the library attendant who has to do her typing in the reading room. In the planning it should be possible to make provision for work of this type. If the subway system in New York can have telephone booths so perfectly insulated acoustically that the outside noise does not interfere with the phone conversation, it should be possible to provide accommodations of a similar type for the library attendant who may have to be available to the general reader and yet has typing to do. Details of library operation will generally be established for the department by the library staff.

#### Comfort for Students and Teachers

Real attention should be paid by the faculty committee to the matter of lecture and recitation rooms' facilities and comfort. Here, also, it is important to provide comfortable seats, adequate lighting, good acoustics and proper ventilation. There is no reason today for any chemistry lecture or recitation room to be lacking in any of these features, and yet, as the author has gone around visiting chemistry departments and speaking before American Chemical Society sections, time after time he has been impressed by the lack of thought evidenced in the design of the lecture rooms. Equipment for demonstration should be visible from all parts of the room; fume ventilation should be provided in the demonstration area; slide and film projection equipment and housing should be handled in the original planning and not as an afterthought. Speaking from personal experience, automatic projection equipment operated from the lecture table by the pushing of a button is much desired by a speaker.

Careful consideration should be given to the method for darkening the lecture room for opaque and movie projection, while at the same time there should be sufficient light for students to take notes. Air conditioning is highly desirable but the system selected should be quiet. Sleeping students do not always mean a dull lecture. Acoustical treatment should be provided on the ceiling and, if necessary, on the walls. The building planner is urged to visit the Rackham Memorial in Detroit and see what can be done to make the lecture room a real addition to the academic program.

#### Design of Furniture

Much more attention often has been paid to the design of laboratory equipment than may seem neces-

sary. It sometimes appears as though every college professor feels he is especially called upon to design laboratory furniture, and there was a time when every installation was different from every other installation, and no two rooms within one installation were the same.

The actual differences in design are often small and unimportant to all save the planner. This makes interchange of equipment between divisions of a department difficult. This is changing because of the pressure of the current situation and the trend toward providing laboratory space for common use by two or more different courses. One evidence is the elimination of complicated cabinets and the increasing use of large drawers in the desk, common space being provided for the storage of ring stands and other ironware and equipment common to all the students using the same desk area.

The faculty committee next has to decide on the materials used in the desks. Should they be wood or steel? A definite trend toward steel is now taking place. Should the table tops be alberene, kemrock, wood, or what type of construction? There are points in favor and against each. Should the desks be provided with individual hoods or should the laboratories have large hoods to handle groups of students? In the past this has been a matter of individual preference. How should the service piping from feeder lines be brought in? What particular services are required by the laboratory courses being given in the room? The common services are gas and water; electricity, air, vacuum, and steam are frequently provided. What kind of floor covering should be used—cement alone, cement with rubber mats, mastic, wood, linoleum?

#### Current Improvements

The manufacturers of laboratory furniture are to be applauded for the interest they have shown in improving their products. There has been much research on chemical-resistant materials for finishing wood and steel furniture and for table tops. The results are not yet completely in evidence, for it is still difficult to obtain some of the necessary resins, but definite improvements are on the way. One of the matters on which more research needs to be done is that of an adequate laboratory floor covering. The most common flooring is a cement floor; this is also the hardest on the feet of the students. Many industrial laboratories are using mastic tile, which is easier on the feet. This is better for industrial than for student use, for such flooring is affected by acids and alkalis and by organic solvents. With proper upkeep and good house-keeping, this can be very satisfactory and damaged tile can be replaced.

Wood floors have been widely used in the past but in times of flood or fire, these are not too good. Research has been carried out by the makers of materials like linoleum, substituting vinyl resins and other resistant resins for linseed oil and similar oil binders. There is some hope that these new floor coverings may be of

use in the laboratory. Other laboratories use rubber mats over cement. We in our own laboratory use a heavy roofing paper over cement. This comes in the form of 36-inch wide strips, is cheap, quite satisfactory to work on, and can be easily replaced.

#### Provisions for Special Features

In addition to the usual laboratory services, there are special services for which provision must be made in planning a building. One such is glass blowing. Most universities have a glass blower with a room provided for special work; student glass blowing is generally done out in the open laboratory. One of the most distracting noises in a laboratory is the blast lamp. Why should not the glass-blowing bench either be provided with some type of sound insulation or one of the quiet blast lamps be made available for student use?

All research laboratories today need constant-temperature and constant-humidity facilities. New designs for such equipment which have evolved from wartime needs are sensitive and not too expensive. Likewise many laboratories will wish to install hot and cold rooms. In our own laboratories we have frequent need for temperatures as low as  $-20^{\circ}$  F. and as high as  $100^{\circ}$  F.

The up-to-date laboratory provides special rooms for micro- or semimicro-analysis. Dark rooms are required for photomicroscopy and photochemistry, as well as for electron microscopy, spectroscopy, and spectrophotometry. Consideration should be given to the probable need for these special laboratory services.

#### Special Rooms

In any building there are the service rooms to consider. Small rooms for interviews will be appreciated by personnel men who interview senior and graduate students day after day. Adequate rest rooms should be provided for men and women with separate rooms for students and staff. Industry is ahead of educational institutions in providing attractive and adequate facilities.

Adequate storage space is needed by the maintenance staff for supplies and heavy equipment. Do not make this a last minute item. Time will not permit any real coverage of the subject of the most effective type of dispensing service for chemicals and glassware, but generally just enough space is set aside for this purpose to meet the immediate needs at the time of the opening of the building; no thought is given to the fact that supplies will increase at a greater rate than the enrollment. For one thing, there is constant purchase of special equipment for staff research projects;

such equipment is never dismantled but is always kept in storage for the time when it might again be required. Dead storage space should not be expensive space; in fact, there is no real reason why dead storage should be provided within the confines of the laboratory building.

The larger laboratories will want to install dishwashing service on a pickup and delivery basis. Adequate provisions should be made for departmental and staff offices. It is common practice to install a laboratory desk in an office, under the assumption that the faculty man will wish to do his research in his office. Industry has found this to be a mistake, as it probably is for educational institutions, particularly the larger ones. What ordinarily happens is that the faculty man thinks he will do his own work, gradually gets away from the laboratory desk, brings in a graduate student to work at the desk, and then the room is no longer available for private faculty-student conferences. It is much better to provide small offices adjacent to the research laboratory, such as has been done in the Regional Laboratories of the United States Department of Agriculture.

#### In Case of Fire

Many industrial laboratories have a fire-protected vault for research notes and valuable records. Educational laboratories could profit from such an installation for academic and research records and valuable papers. Consideration should be given to adequate fire protection for students and staff and for the building. Sprinkler heads have many advantages. Safety showers, fire blankets, and fire extinguishers should be easily available; asbestos suits should be stored in prominent positions where they can be easily reached in case of an emergency.

Every building, large or small, should have some kind of first aid facilities, preferably an equipped room used for that purpose alone.

There are many other problems which have not even been approached in this brief discussion of general laboratory design, but the author wishes to stress the desirability of working toward the objective of an attractive, well-ventilated and lighted, acoustically-satisfactory laboratory building. Halls do not need to echo to the march of tramping feet; offices and classrooms do not need to reek with the memory of by-gone experiments; laboratories need not be reminiscent of antique shops. Resistant laboratory finishes, both light and attractive, are available. Lecture room chairs do not have to squeak and groan in vocal protest to the unhappy squirming of the uncomfortable occupant. An ounce of prevention here is worth many pounds of cure.

# GUIDE FOR SCHOOL SHOPS IN CALIFORNIA

By SPENCER D. BENBOW

Administrative Assistant in Charge of Adult and Vocational Education, Oakland Public Schools, and  
General Chairman, California School Shop Planning Study

A COMMITTEE of twenty administrators and supervisors of trade and industrial arts education programs in California compiled this guide for the housing and layout of school shops in California. The state superintendent of public instruction appointed the committee on the recommendation of the chief of the Bureau of Trade and Industrial Education. Each member was accredited by a selection committee on the basis of his experience and position as an administrator or supervisor of industrial education programs in California. The technical committees were composed of more than 90 members.

Educational specifications were derived from statements of principles, standards, criteria, and objectives in literature on school shop planning and others recommended by committee members. Working individually, they appraised and rephrased these statements. A steering committee of four edited them. Then the entire committee accepted or rejected the final statements.

The suggested specifications are a guide to educators and architects planning to build new school shops or modernize existing shops in California. Twenty-four shop layout plans illustrating the application of suggested specifications were produced by technical committees working with the central committee.

## How the Study Evolved

In 1947 many school districts in California were planning postwar building programs or already were engaged in them. There was an acute need in the



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state for a manual on school shop planning to aid the educator and the architect in planning school shops. The trade and industrial education bureau and the state division of school planning reported that shop planning information was in great demand by California schools. They had little material to give them. To meet this need, the two state offices sponsored this study. The previously mentioned committee of twenty was appointed to work with them.

## How the Committee Worked

The committee objective was to develop a guide for the housing and layout of school shops. The school planning division through Doyt Early, architect, and the trade and industrial education bureau through Samuel L. Fick, bureau chief, participated in the entire study. As a doctoral research project, the study was supervised also by L. H. Peterson and other members of the committee chairman's doctoral committee at the School of Education, University of California (Berkeley).



As the architect writes construction specifications for the builder, the California School Shop Planning Committee has tried to write educational specifications for the architect and educator. The result is an illustrated manual on school shop planning that answers questions like these:

1. How large should shops be? What should be the dimensions of a shop for a given area?
2. Should shops be located in the main building or a separate building? Should they be one floor only?
3. How much light is required?
4. How can safety be built in?
5. What is the best shop floor?
6. How can shops be planned for evening, adult use?
7. How should shop equipment be located? What are the guiding principles?
8. What are the requirements for shop classrooms, storage, toolrooms, supply rooms? Where should they be located?
9. Should shop equipment be painted? What colors?
10. What is a good floor layout for a wood shop? Metal shop? Auto shop? General shop? Print shop?

Radio shop? Cosmetology shop? Others commonly found in California schools?

To answer these questions 128 educational specifications were evolved in nine areas of school shop planning: the shop building, flexibility and expansibility, size and dimensions of shops, the equipment and layout in open shop area, auxiliary rooms and facilities, visual comfort and efficiency, ventilation and heating, flooring, and steps in planning school shops.

The following shop floor plans are included: *Industrial Arts*—auto mechanics, aviation, electric and radio, general metal, general shop, graphic arts, handcraft, machine shop, mechanical drawing, and wood; *Vocational*—aircraft engines and aircraft mechanics, auto mechanics, cosmetology, drafting, electric, food trades (cooking, baking, and waitress training), machine, mill cabinet, printing, radio, sheet metal, and welding.

A list of the personnel of the California School Shop Planning Committee and a selected reference bibliography appears at the end of the report.

## CALIFORNIA SCHOOL SHOP PLANNING STUDY

### The Shop Building

1. School shops should be housed in one or more shop buildings or shop wings planned as integral parts of the total educational plant.

2. Shop buildings or shop wings ideally should be one story in height.

3. Aeronautics, automotive, and other shops requiring unobstructed floor areas should be housed in a one story building for simplicity in building design.

4. Building units should be connected by covered walk passages, the passages to be of the open pergola type where weather permits.

5. A trade school building site should be large enough to provide for future expansion, centrally located, near good public transportation facilities, near (or including) car parking space, and located in a neighborhood that attracts qualified students and the esteem of industry, parents, and the public.

6. The site area devoted to industrial arts should be large enough to provide for future expansion. It should be adjacent to or connected with the academic unit site area. It should be near the street for automobile and truck access.

7. Vocational shops should be grouped according to their relation to each other: building trades, needle trades, food trades, metal trades, automotive trades, graphic arts, service occupations, etc.

8. Noisy school shops such as those for auto body and fender work and diesel engines should be located

so that they do not disturb other school activities. This qualification does not mean isolation.

9. Shops should be accessible for adult evening use.

10. Vocational shops depending on customers for instructional projects (cosmetology, cleaning and pressing, cooking, auto mechanics, radio service) should be easily accessible to customers.

11. Auto shops and other shops requiring automobile or truck access should have entrance and exit to driveways.

12. Heavy equipment shops should be located on the ground floor.

13. In a multiple story shop building the floor location of shops should take into consideration floor equipment load, service requirements, accessibility to customer public, natural lighting requirements, and elevator service requirements.

14. School shops should not be located in basement areas.

15. Shops should be treated acoustically for auditory comfort.

16. Acoustical material should be made so that staining and restaining will not harm its acoustical properties.

17. Shops should be located away from playing areas.

18. Shop ceiling height should be not less than 12 feet, preferably 14 feet.

19. Vocational aeronautic shops should be located



on an airport or within easy access to an airport.

20. School shops which create fumes (auto, diesel engines, painting) should be placed, if possible, so that prevailing winds will carry fumes away from other school buildings and private property adjacent to the school.

#### Flexibility and Expansibility

21. Partitions between shops should be non-bearing curtain walls as free as possible from mechanical and utility installations.

22. Fenestration pattern should be continuous along entire wall rather than grouped especially for each shop.

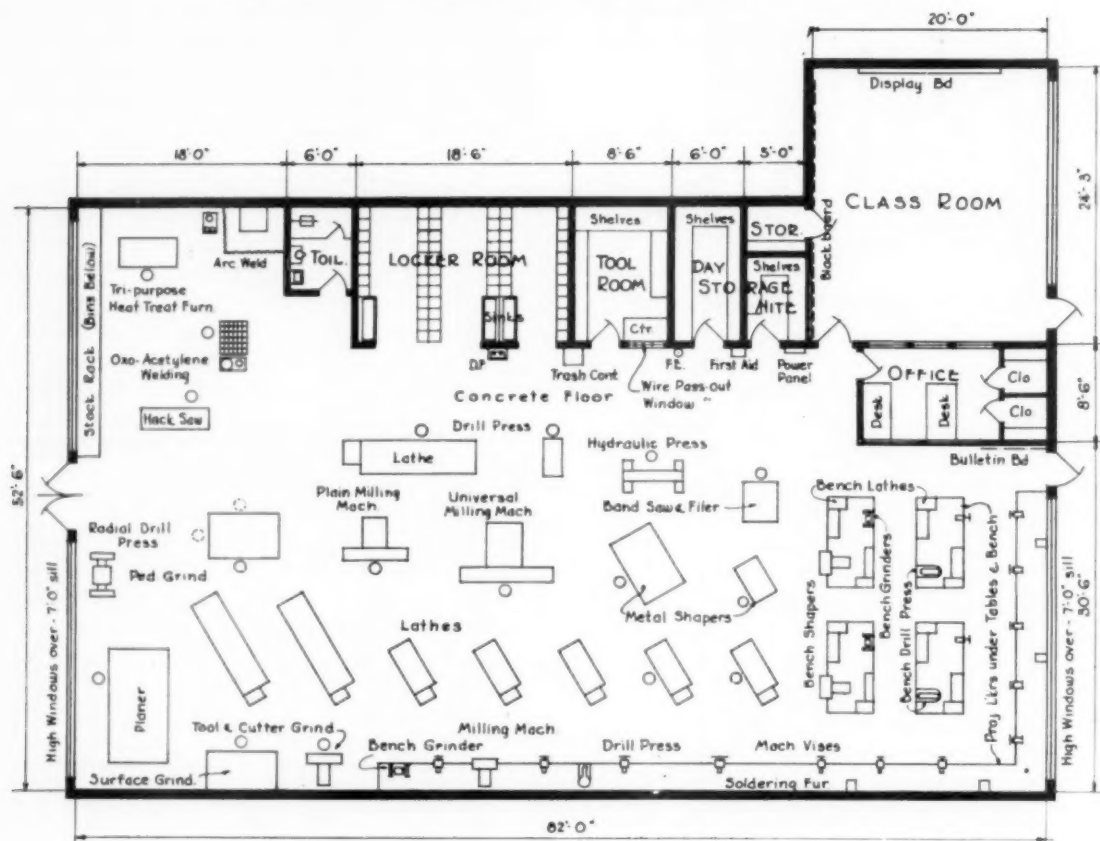
23. Heating and lighting services should be engineered so that controls serve relatively small areas within shops.

24. Conduit and other utility supply services should be based on a liberal rather than restricted estimate of future needs.

25. Cabinets, lockers, shelves, and work benches should be standardized as far as possible.

26. Shelving in cabinets, lockers, and other areas should be adjustable, except where safety requires rigid shelves.

27. Corridors should be carried through to outside walls wherever extensions are possible. Stairs should be placed in separate enclosures off the corridor rather



VOCATIONAL & INDUSTRIAL ARTS MACHINE SHOP  
CALIFORNIA SCHOOL SHOP PLANNING STUDY  
1948-49

than in corridor ends where they are out of the way.

28. Ample site area should be left undeveloped where building additions are logical.

29. Partitions between shops should be so constructed that they can be removed to convert two shops into one; three shops into two, or other space arrangements as conditions warrant.

#### Size and Dimensions

30. Industrial arts shops will vary in size according to the activity to be housed, but the following space allotments are recommended as a guide in establishing space requirements for the open shop area. The allotments are based on an hourly class load of 24 pupils.

A. Heavy shops: general shop, wood, metal, machine, graphic arts, auto, electric and radio, aviation.

Shop	Square feet per pupil	Square feet total open shop area
Minimum	75	1800
Adequate	100	2400
Desirable	125	3000

B. Light shops: mechanical drawing, crafts.

Shop	Square feet per pupil	Square feet total open shop area
Minimum	40	960
Adequate	50	1200
Desirable	60	1440

31. Vocational trade and industrial shops will vary in size according to the activity to be housed, but the following space allotments are recommended as a guide in establishing space requirements for the open shop area. The allotments are based on a class load of 20 students.

#### Space Allotments Recommended for Open Shop Area in Vocational Trade and Industrial Shops.\* —(20 students)

A. Heavy shops: auto, machine, cabinet, electric, sheet metal, body and fender, welding, carpentry, cooking and baking, graphic arts.

\* Aviation and cosmetology not included. Aviation shops should meet Civil Aeronautics Administration requirements. Cosmetology shops should meet standards of state board of cosmetology.



Shop	Square feet per pupil	Square feet total open shop area
Minimum	100	2000
Adequate	150	3000
Desirable	200	4000

B. Light shops: drafting, power sewing, radio, industrial science laboratory.

Shop	Square feet per pupil	Square feet total open shop area
Minimum	50	1000
Adequate	75	1500
Desirable	100	2000

32. The open shop area should be rectangular.

33. The width to length ratio of the open shop area should be from 1:1½ to 1:2.

#### Open Shop: Equipment and Layout

34. The instructor should be able to survey the entire open shop area from any point.

35. The shop instructor should have headquarters in the open shop area, or office with clear glass windows, equipped with one or two desks, chairs, and files, placed so that they command a full view of the entire shop.

36. Equipment should be arranged in accordance with safety, instructional efficiency, and industrial practice, respectively.

37. The size and shape of the open shop area should

be determined largely by the equipment arrangement plan.

38. Equipment and work stations should be placed so that there is no danger of interference with adjacent workers.

39. Equipment and work stations should be placed, where possible, so that related activities are in close proximity.

40. Distinct aisles of travel should be provided for free flow of student traffic between all areas and points of common usage such as storage rooms, toolrooms, and common machine areas. Aisles of travel should be not less than 3 feet, preferably 4 feet.

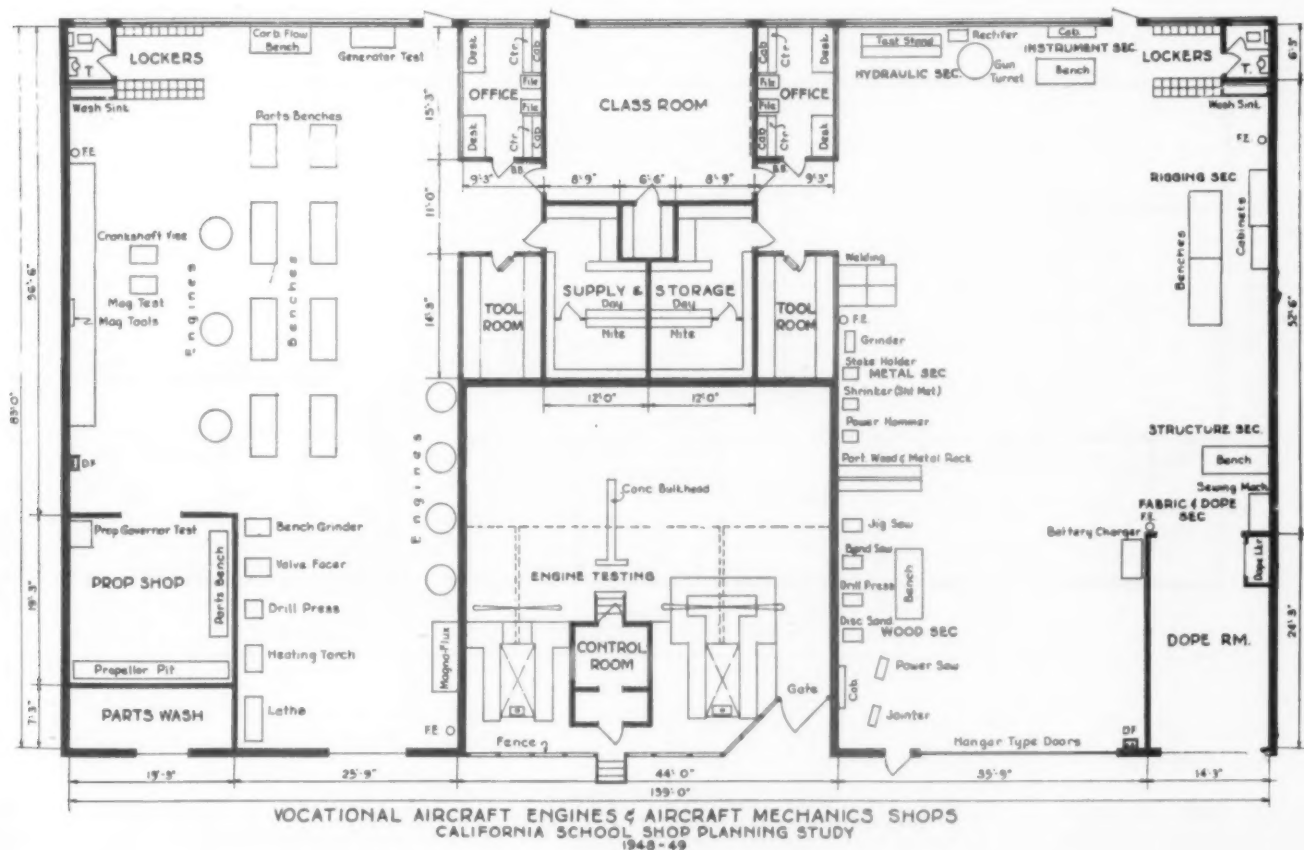
41. Space between benches, machinery, equipment and aisles should be sufficient for safety and free passage. This is determined by the nature of the shop work and the equipment involved, but should be not less than 3 feet, preferably 4 feet.

42. Machines around which danger zones exist should be adequately guarded and lines painted in red or in contrasting color on the floor around the machines to indicate danger zones.

43. All shops should have at least two exit doors and one should be larger than the largest piece of equipment or instructional project to be moved in or out of the shop.

44. Open spaces should be provided near entrances and exits to eliminate congestion.

45. A clear floor space (4 feet to 6 feet) should be provided in front of the toolroom issue counter.



46. An open assembly area should be set aside in general shops, wood shops, and other shops requiring space for assembly of projects.

47. The auto shop should have an off-the-street area outside the shop, surfaced and preferably enclosed.

48. If lumber, bar steel, and other materials are to be stored in the open shop area, they should have special racks and shelving.

49. Equipment, except for the portable type, should be fastened securely to the floor, heavy bench, or other stable foundation.

50. Heavy equipment should be mounted on concrete bases projecting to the floor level and insulated from the floor slab and other structural members of the building.

51. Machines that create a vibration problem should be cushioned with rubber mountings or other shock absorbing material.

52. Bases for cabinets, benches, and machines should have toe space for the comfort of the student worker.

53. Machinery should not be mounted on columns or against pipes if these will transmit noise to other parts of the building.

54. Equipment occupying floor space should allow easy cleaning around the base.

55. Operation level of equipment should be set at the average elbow height of the students.

56. The start-stop switch box should be located within easy reach of the operator.

57. Built-in work benches 28 inches wide with heavy wooden tops at least 1½ inches thick, covered with ten gauge steel plate should be provided along most outer walls in the automobile, machine, and metal shops. The space underneath these benches should be enclosed with locked steel doors with storage for parts or projects. Electric shop benches should be similar but not covered with steel plate.

58. Machines which are used primarily in roughing out stock should be placed near the stockroom.

59. Lockers for the storage of students' personal belongings, and for partially completed small projects should be in all school shops.

60. Separate, additional lockers should be provided for adult evening classes.

61. Lockers should be placed on 6-inch foundation.

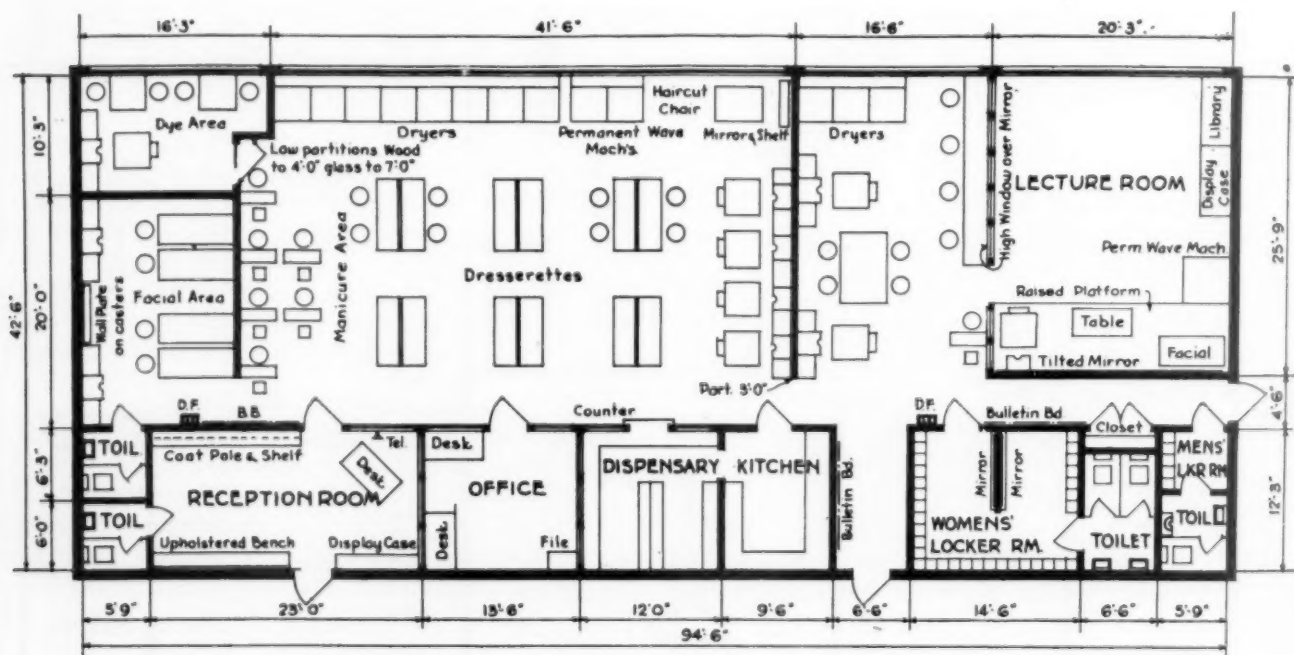
62. The locker area should provide space for changing clothing, where this is necessary.

63. The locker area should be located so that it can be readily supervised by the instructor.

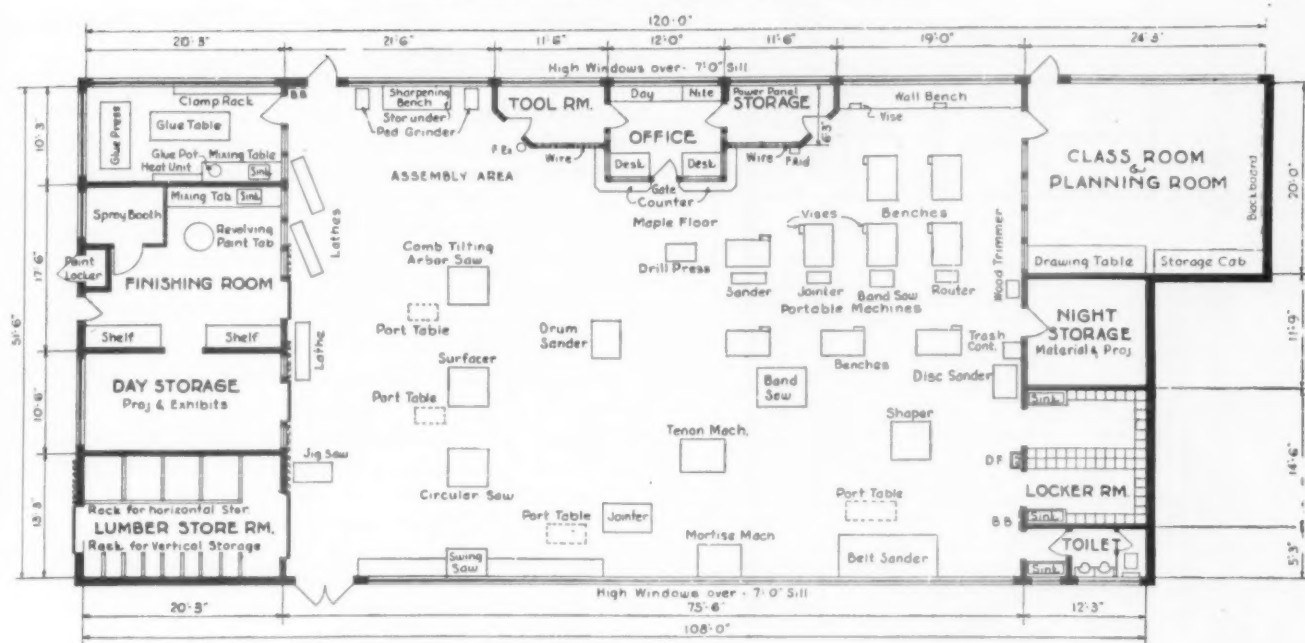
64. Lighted exhibit and display cases should be in the shop and central locations in the principal part of the school plant.

65. Power and light controls should be centralized on a locked master control panel, with pilot light, and located if possible near the instructor's desk or office.

66. Shops using portable power tools should be pro-



VOCATIONAL COSMETOLOGY  
CALIFORNIA SCHOOL SHOP PLANNING STUDY  
1948-49



VOCATIONAL MILL CABINET SHOP  
CALIFORNIA SCHOOL SHOP PLANNING STUDY  
1948-49

vided with one double electric wall outlet every 10 feet of wall space.

67. A washing station should be provided for each five students in shops such as wood, metal, printing, and auto.

68. Hot water should be available in all shops.

69. Every shop should have a drinking fountain, where it will not cause congestion, but in view of the instructor.

70. One or more general bulletin boards should be placed in strategic positions, such as the entrance to the shop or toolroom.

71. Fire extinguishers must be part of shop service equipment, located conveniently near points of danger and marked or labeled conspicuously.

72. The shop first aid kit should be in the instructor's area or office.

73. A space should be set aside in each shop for the waste and refuse container. In shops that accumulate considerable waste and refuse the container should be mounted on rollers to facilitate collection.

74. Gas welding tank storage should be outside the welding shop, preferably close to driveway.

75. Storage units should be kept below the working level in printing shops.

#### Auxiliary Rooms and Facilities

76. The number and kind of auxiliary rooms and areas depend upon the type of shop, but all shops require auxiliary rooms and areas of one kind or another which should be planned with the rest of the shop.

These are toolroom, supply room, storage room, shop classroom or instructional area, shop office, finishing room, toiletrroom.

77. Every shop, or group of related shops, should have its own supply or storage room. Size is determined by the nature of the shop work, students to be accommodated, and the type and quantity of supplies stored.

78. The supply room should be located for easy unloading from delivery trucks and easy storing as well as convenience in issuing supplies to students.

79. The lumber supply room or other supply room storing heavy or bulky material should be located, if possible, so that delivery trucks can unload directly into it. For these rooms the doors in the opposite end should open directly into the open shop area.

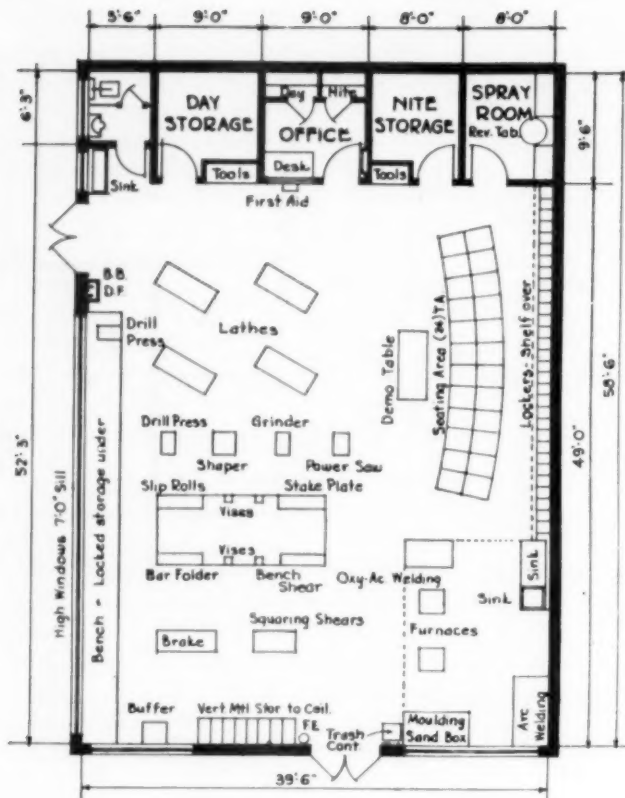
80. With few exceptions each vocational shop, or group of related vocational shops, should have its own toolroom. Industrial arts shops may rely entirely on tool panels or cabinets.

81. Separate supply storage and project storage facilities should be in shops to be used extensively by adult evening classes.

82. Both the supplyroom and the toolroom should be located so that students can reach them and return to their work stations by passing as few other students and machines as possible. These rooms therefore are usually in the center of the long side of the shop.

83. Racks, shelving, drawers, cupboards and cabinets, designed for items to be stored, should be pro-





INDUSTRIAL ARTS GENERAL METAL SHOP  
CALIFORNIA SCHOOL SHOP PLANNING STUDY  
1948-49

vided in the supply-storage room and in the toolroom.

84. The toolroom should be designed so that the instructor can easily observe what the tool-keeper is doing without having to enter the toolroom itself.

85. A small shop classroom is a highly desirable adjunct to most shops for planning, drafting, and related studies. An instructional space in the open shop area or a nearby standard classroom may be used instead of a shop classroom.

86. A shop classroom of 480 square feet (20 feet by 24 feet) is large enough for most shops. For instruction space in the open shop area 12 feet by 18 feet should suffice.

87. The shop classroom should be equipped with a teacher's desk, demonstration table or bench, six large tables with 24 straight back chairs, 10 to 20 feet of chalkboard, 20 feet of pinning board, library shelving for shop reference library, cabinets for storing blueprints, catalogs, and other reference material, and one electric wall outlet on each wall. The room should be acoustically treated.

88. If instruction space in the open shop area is used instead of a classroom, it should be provided with a teacher's desk, demonstration table or bench, portable chalkboard, 24 tablet arm chairs, and cabinets for storage of instructional materials.

89. Separate lock-up space should be provided for evening instructors.

90. Toilet facilities should be provided for in the shop area unless the overall building plan provides general toilet facilities. Shop location is preferred.

91. Compressed air should be provided by a central air compressor unit with outlets in the shops that require compressed air. A stand-by auxiliary unit should be provided if there is considerable pneumatic equipment in the shops.

92. The shop air compressor unit should be located so that noise from its operation will not disturb classes. It should *not* be located in an open shop area.

93. A separate dust proof finishing room equipped with an independent exhaust system is recommended for wood shops, cabinet shops, and other shops where project finishing is done.

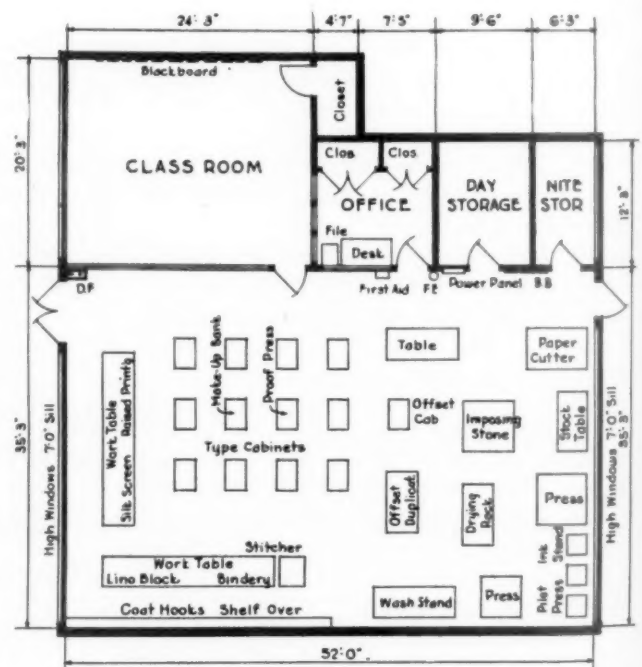
94. Shop classrooms or other classrooms should be equipped with electrical outlets and controls, and built-in screen for showing pictures.

95. Electrical outlets and controls should be arranged for a minimum of teacher movement, with outlet and controls for room lights and projector at one point.

96. A special cabinet on wheels is recommended for moving projection equipment from one part of the building to another.

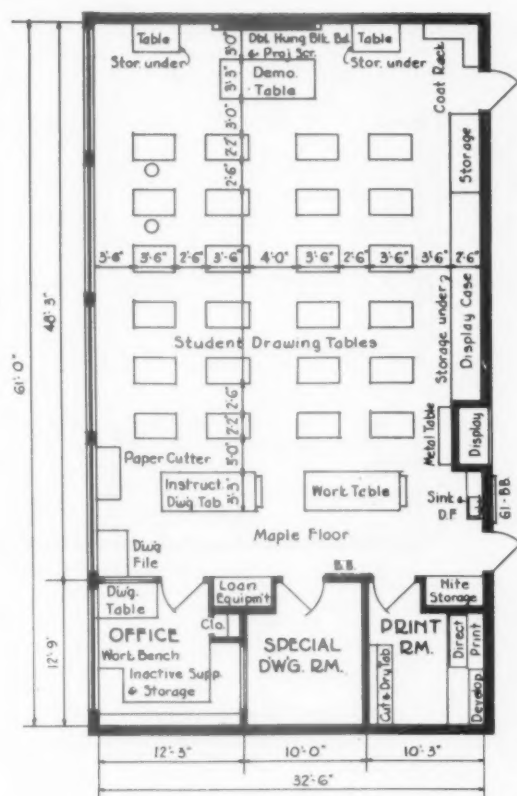
#### Visual Comfort and Efficiency

97. Full advantage should be taken of the possibili-

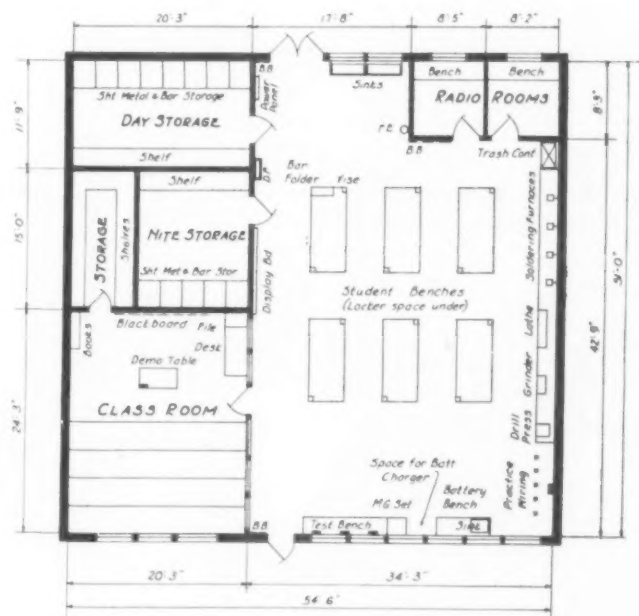


INDUSTRIAL ARTS GRAPHIC ARTS LABORATORY  
CALIFORNIA SCHOOL SHOP PLANNING STUDY  
1948-49

107. Operating machine parts should be finished in colors that strongly contrast with the non-operating

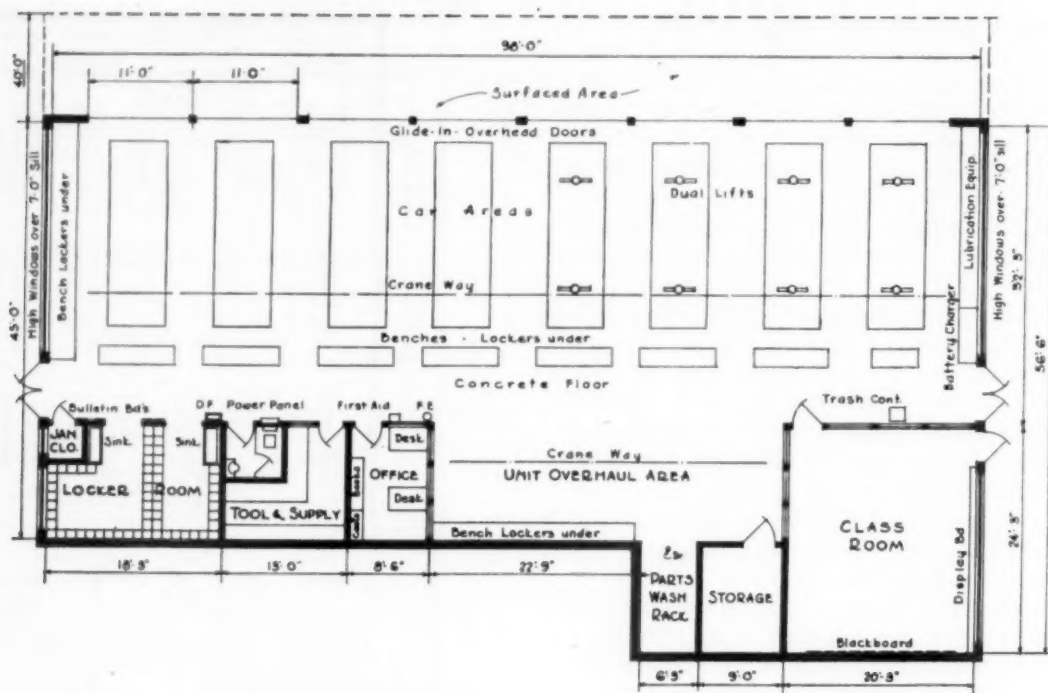


INDUSTRIAL ARTS MECH. DRAWING ROOM  
CALIFORNIA SCHOOL SHOP PLANNING STUDY  
1948-49



INDUSTRIAL ARTS - ELECTRIC & RADIO SHOP  
CALIFORNIA SCHOOL SHOP PLANNING STUDY  
1948

114. The heating system should maintain automatically a temperature of 68 degrees measured 60 inches above the floor for shops and 70 degrees measured 30 inches above the floor for classrooms.



VOCATIONAL AUTO SHOP  
CALIFORNIA SCHOOL SHOP PLANNING STUDY  
1948-49

115. The temperature variation from floor to 60 inches above it should not exceed 5 degrees, preferably 3 degrees.

#### Flooring

116. Flooring selected should have a resilient, durable surface. It should be insulated to reduce noise in the shop and prevent noise transmission to other shops and classrooms.

117. Flooring should be pleasing in appearance, easily cleaned, finished to reduce the danger of slipping, and require a minimum of repairs.

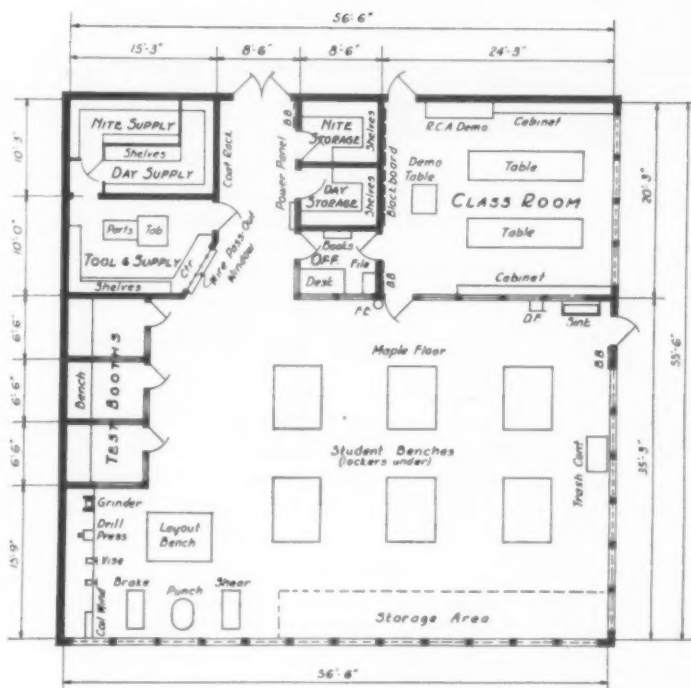
118. Flooring materials will differ from shop to shop and within a particular shop to meet the needs of the activity accommodated. The following common flooring materials rated "S" are satisfactory for shops and areas indicated. Those rated "1" are first choice.

#### Flooring

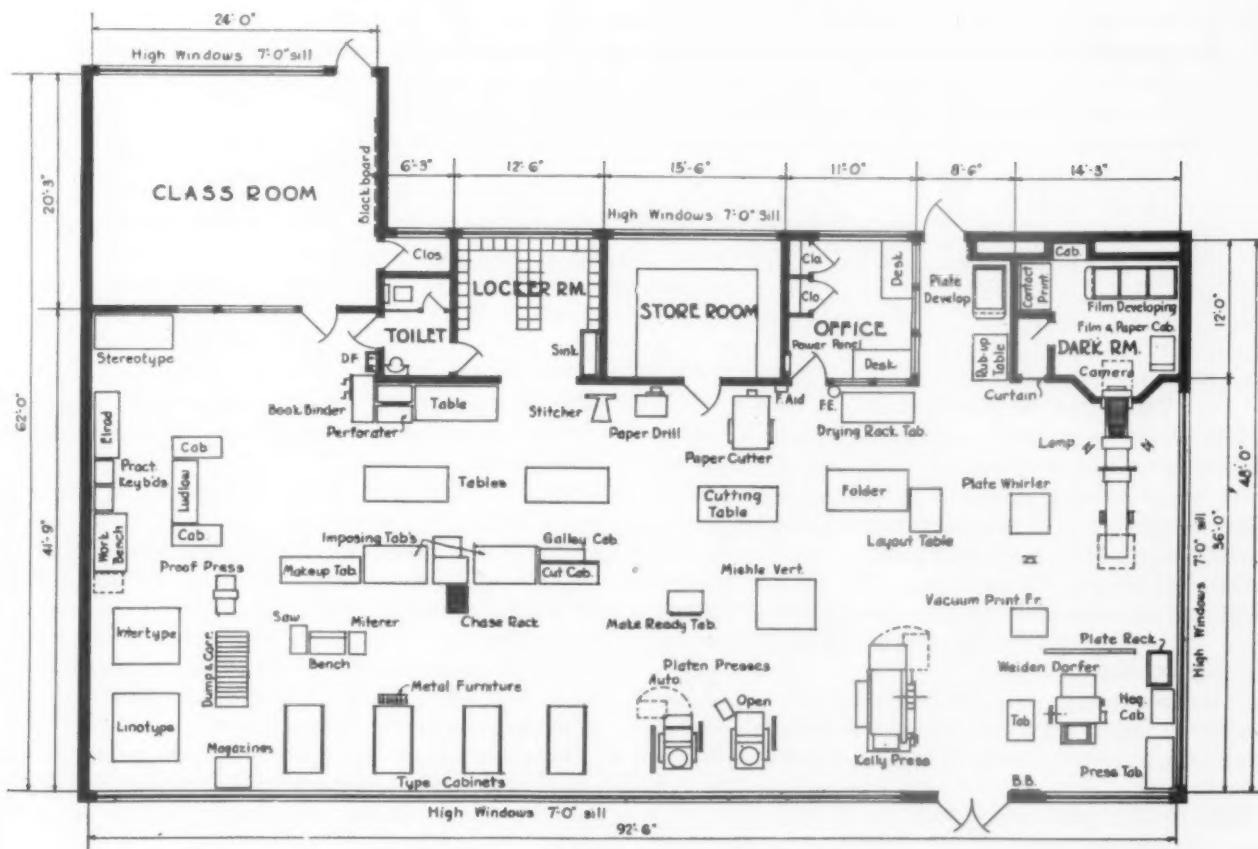
Shop	Maple	Vert. Grain Douglas Fir	End-grain Wood Block	Concrete	Linoleum	Asphalt Tile
General Shop	1	S	S			
Wood, Cabinet Carpentry	1	S	S			
General Metal, Sheet Metal	S	S	S	1		
Electric, Radio	1	S			S	S
Crafts	1	S			S	S
Graphic Arts, Printing	1	S			S	S
Mech. Drawing, Drafting	1	S			S	S
Auto Mech., Body & Fender				1		
Aviation				1		
Machine Shop			S	1		
Power Sewing	1	S			S	S
Cosmetology	S	S			1	S
Welding				1		
Cooking & Baking	S	S			1	
Foundry				1*		
Forging				1		
General Classrooms, Offices	1				S	S

\* Unfinished concrete or dirt.

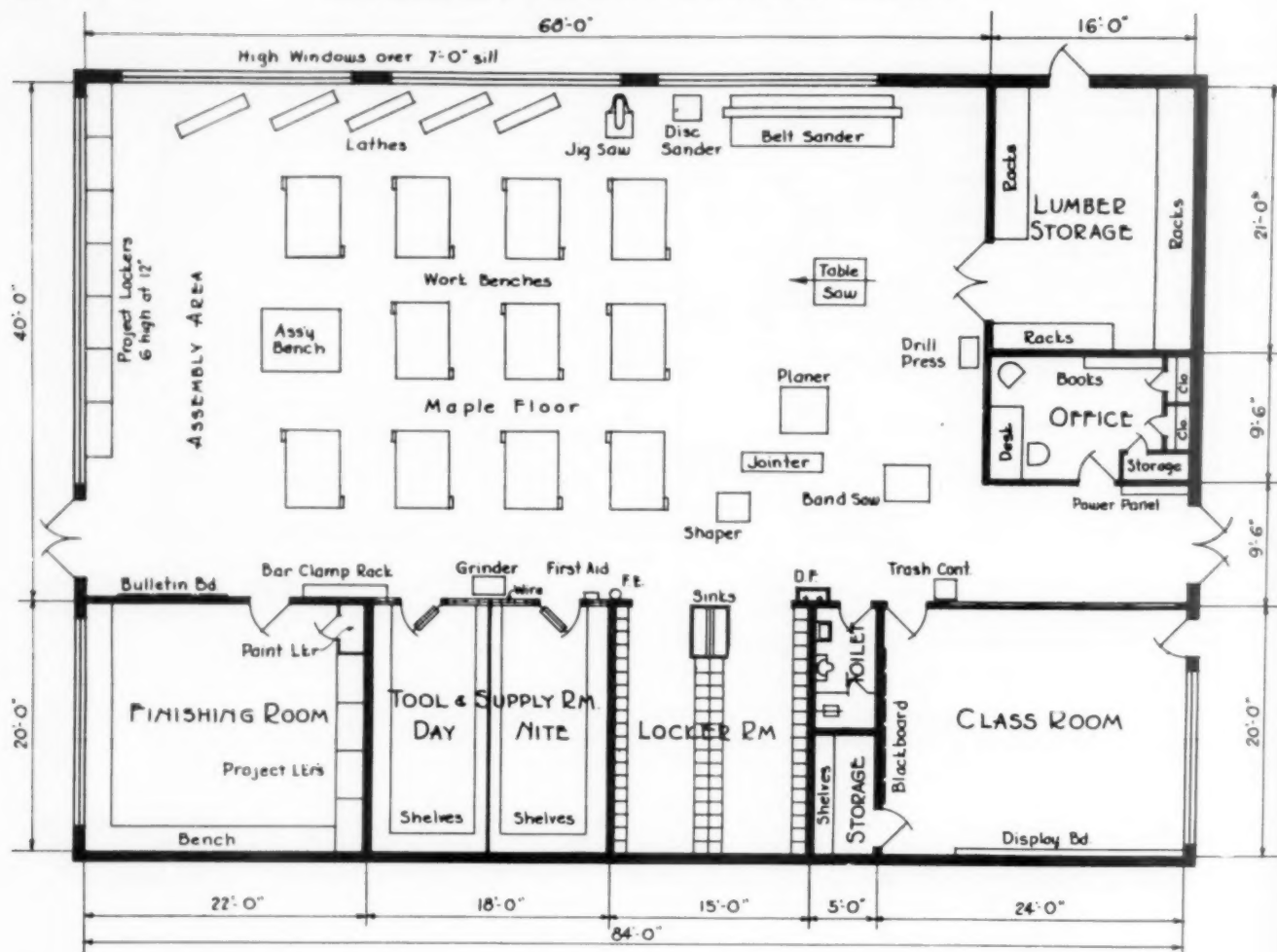




VOCATIONAL RADIO SHOP  
CALIFORNIA SCHOOL SHOP PLANNING STUDY  
1948  
Scale 1/4" = 1'-0"



VOCATIONAL PRINT SHOP  
CALIFORNIA SCHOOL SHOP PLANNING STUDY  
1948-49



INDUSTRIAL ARTS WOOD SHOP  
CALIFORNIA SCHOOL SHOP PLANNING STUDY  
1946-49

#### Ten Steps in a School Shop Plan

119. Describe in some detail the educational activities to take place in the shop. The instructor, supervisor, administrator, advisory committee, and participants concerned with the educational program should participate in the planning.

120. Determine the shop load: the number of students to be accommodated, time available for instruction, age and grade levels of students, and size and number of classes.

121. Become acquainted with current codes and standards for constructing school shops and from this study, develop a reference checklist applicable to the shop in plan.

122. Hold a preliminary conference with the architect, discussing educational activities, shop load, standards, building design, space considerations, and cost limitations for guidance in further planning. Visits with the architect to well planned school and

industrial shops will give him some good design ideas.

123. List equipment, tools, and supplies to be used in the shop.

124. Decide what principal areas, facilities, and auxiliary rooms are needed.

125. Draw in consultation with the architect a preliminary shop floor layout to scale, showing location of principal areas, facilities, auxiliary rooms, and equipment.

126. Prepare, for the architect, a description of the shop and set of "instructor specifications" to explain and supplement the floor plan.

127. Assist the architect in revising the preliminary plan, answering additional planning problems posed by him. Detail sketches of built-in equipment should be provided at this time.

128. Assist the architect by answering questions of detail as they appear during final planning and construction.

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# SPECIFICATIONS FOR SCHOOL SHOPS

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THE generally recognized educational value of shop work is that it relates and gives meaning to the other subjects on the curriculum. Students find a sense of individual satisfaction and accomplishment which serves to sustain and promote interest.

Provision for practical activities is made in the homeroom for kindergarten and the junior grades. Shop work as such is not generally introduced until the seventh grade, or age twelve.

Apart from the educational value of shop work, other values equally important may be listed as follows:

*Citizenship Training.* The ability to make, repair, maintain and operate equipment found in the home and to develop an appreciation and understanding of industry.

*Guidance.* An opportunity for the pupil to explore the nature of various industrial vocations and to determine those in which he excels.

*Trade Training.* Basic trades training in the senior grades which will prepare the pupil for entry to a selected trade with definite recognition regarding the extent and value of his school training.

The way in which shops are classified or organized vary with local jurisdiction. The suggested classification should, therefore, be modified to suit each community's conditions.

## General Shops

These shops offer practical training to pupils in grades 7 through 12 as part of their general education. Pupils attend at least one-half day per week. Activities involve work in drafting, wood, metal, plastics, electricity, mechanics, or such other practical media as may be selected.

The equipment consists of a good range of hand tools supplemented by a limited range of inexpensive power-driven equipment of the bench-type operated by fractional horsepower motors.

## Shops for Trades and Industries

These shops are intended to serve those pupils who propose to terminate their schooling in grades 12 to 14, and who will make direct entry into trades and industry. Entry to such shops should be in grade 11 and attendance may continue to 12 and in some cases grade 14.

Such specialized shops are not justified for general educational purposes. Their establishment should be considered when local trades and industries are prepared to recognize and absorb the graduates.

Pupils in specialized shops generally attend the shop 50 per cent of their time in grade 11 and an increasing percentage in succeeding grades. The remaining school time is spent in related subjects. In some cases ar-

rangements are made where pupils may spend part of their time in the school and part in the trade.

The equipment in trade shops must be of a class and kind generally acceptable in industry. This, however, does not mean the inclusion of heavy duty production-type machinery.

In rural communities the practical training offered in conjunction with regular education may take the form of instruction in farm mechanics and agriculture. A farm shop may be organized on similar lines as that outlined for general shops.

If specialization in certain branches of farm mechanics or agriculture is indicated, then shops may be planned on similar lines as that outlined for trades and industry shops.

#### Shop Capacity and Utilization

For teaching in shops to be effective, much if not all of the instruction should be on an individual basis. Two conditions make this difficult: individual differences in pupils and the limited extent and variety of expensive equipment. In order to make full use of the equipment, careful shop management and supervision is necessary. Classes in general shops therefore should be limited to twenty pupils. In shops for trades and industry, the class limit should be fifteen pupils.

Shops of any kind require considerable space and equipment. The expense involved cannot be justified unless the facilities are in full use most of the time.

One general shop is needed for a coeducational school with an enrollment of 400 if the boys attend the shop in groups of 20 for half a day per week. One school's general shop facilities may serve nearby schools.

In isolated areas where enrollment is small a general shop may not be justified, shop work may be offered by providing a small project-alcove off a classroom, or simply by fitting an enlarged classroom with a bench and skeleton equipment for two or three pupils. The pupils concerned may carry out their work while others are engaged in regular seat work. Enclosing this area, even with glass partitions, is of doubtful value since supervision difficulties are sure to arise. Relegating small groups to the basement for shop work is not recommended. Supervision becomes impossible while hazards are invited.

Shops for trade and industry should be established only in the light of an industrial survey which would indicate the kind and number of shops required for ultimate utilization.

Shops of any kind should be made available in the evenings. General shops can perform a useful function in the development of arts and crafts work among the adult population. Shops for trade and industry can offer supplementary technical instruction for those engaged in the trades.

#### Combined Shops

Some schools have each shop in a separately enclosed area while others put shops of the same or

similar kind into one common area. In the first case, the individual teacher can be held responsible for the care and administration of his particular shop. This means, however, that separate facilities of all kinds must be installed in each shop, in many cases causing expensive duplication. Teachers are required upon occasion to leave their classes thereby setting up a danger situation in most individual shops.

If a number of shops of a like kind are together in large areas, it is more difficult to allocate individual responsibilities. However, good administration can overcome this difficulty. Modern industrial plants are laid out to get the maximum amounts of unobstructed floor space to permit flexibility, communication and economy in the distribution of utilities.

If school shops are combined, the following results may be expected:

Less duplication of washing, cleaning and storage space and of expensive equipment.

Less corridor space.

Less expensive exhaust systems (mill, wood, cabinet and pattern shops).

Less need for the teacher to leave shop and better opportunity for supervision during his absence.

Fewer grade entrances required.

More flexibility; areas can be re-allocated at will.

Better ventilation and natural lighting.

Better opportunity for senior teacher to act as supervisor.

Students become acclimatized to conditions which they will meet in industry.

#### Planning the Layout

School shops house highly specialized activities which require a wide range of facilities and equipment. All of the detailed requirements for each kind of shop cannot be foreseen. The size and the necessary fixed utilities are enumerated under the shops concerned. The information given, if used as a guide, should be sufficiently reliable for the general layout of the building to the point where sketch or preliminary drawings can be completed. Before the final drawings are made, shop layouts should be decided by experienced school shop teachers, preferably the teachers who are going to use the shops. If this is not feasible, then the architect has no alternative other than to put in essential fixed utilities at his discretion. In this case utilities, particularly power, should be left so that extensions may be made conveniently.

#### Some General Considerations

Location: Isolated so that noise from the shops will not disturb other school activities. Some shops require grade entrances.

Area: Adequate area (Refer to shop concerned).

Width: Small shops may be governed by classrooms above. A minimum width of 30 feet is desirable for most shops.

Height: In general a 12-foot ceiling is satisfactory. (Refer to shop concerned for special cases).



**Walls:** Light color smooth brick walls are most serviceable. Wall space is at a premium in most shops. Windows should generally be restricted to one long wall. Window sills should be 6 to 12 inches above bench height.

**Floors:** The floor surface is most important. Traction should be good to promote safety. In cases where machines or equipment do not stand under their own weight, a ready and secure means of anchorage is essential. If concrete must be used it should be dust resistant. (Refer to shops concerned for suggested floor.)

**Lighting:** Good seeing conditions are important. Natural light in large shops may be secured with saw-tooth or monitor type roofs. (For artificial light intensity refer to shop concerned.)

**Power:** Where power is used for machines operated by pupils, 220-volt, 3-phase is recommended. Higher voltages present additional hazards and while not desirable may still be used.

The distribution system for lighting and convenience outlets should be 110/220-volt, single phase. Power distribution should be flexible to permit rearrangement of machines without damage to the building. Floor outlets or connections should be avoided unless their position can be assured for the life of the building.

Master controls should be conveniently located and provided with lock protection which will disconnect the power in zones or all of the shop to meet emergencies.

Remote control switches and heating devices should be provided with pilot light protection.

Motors over 1 horsepower 3-phase should have overload and no voltage protection. Fractional horse power motors 110/220, single phase should have overload protection.

**Gas:** In shops where a number of gas outlets are used, a master control conveniently located and provided with lock protection is desirable.

**Compressed Air:** In cases where a number of shops require compressed air, a centralized compressor should be installed and lines run to shops concerned.

**Ventilation:** In shops where activities cause fumes, dust, odors, etc., independent means of exhaust is necessary. The exhausts should be carried to some point where fumes or dust cannot reenter the building.

**Washing:** Washing facilities are required in shops for personnel and in some cases for processing. (Refer to shop concerned for washing facilities.)

**Acoustic Treatment:** Noisy shops, such as sheet metal and welding shops, may be provided with acoustic treatment. It is doubtful whether most school budgets can afford acoustic treatment for all shops.

**Tool Cribs:** Unless arrangements are made for a paid tool crib attendant, it is advisable to decentralize tools and keep them in cupboards or racks convenient to particular activities within the shop.

**Storage:** In general, materials and supplies should be stored in the shop area concerned. Storerooms attached to each shop are likely to become dead stor-

age areas and accumulate useless materials. Visible storage within the shop will promote tidiness and good housekeeping. If a number of shops are involved, a general storeroom may be considered.

**Benches:** Benches are very important. They should be substantial and of the right height and size for the activity concerned. In some cases they should be fixed while in other cases portability may be desirable. Wood tops are generally required. Such tops may be narrow edge grain material, tongued, glued and through bolted. If tops are good on both sides they may be reversed, thus giving double life.

In motor mechanics and shops where bench tops are likely to be oil soaked, they should be covered with 16-gauge sheet metal. In shops where soldering, wiping, etc., is done, tops may be covered with 3/8 inch transite.

**Safety:** There is an element of danger in most practical activities. Every effort should be made to establish facilities, arrange equipment, and install guards which will promote safety. Federal and state agencies and accident prevention societies are prepared to give reliable information and advice concerning safety. Advantage should be taken of these services.

**Fire Precautions:** Various fire hazards and methods of fire fighting are associated with different practical pursuits. Apart from the general fire fighting equipment in the school, special equipment may be necessary for specific shops.

Fire fighting equipment of any kind should be approved and maintained according to the recommendations of the fire underwriters or other authorities concerned.

Steel storage cabinets for oils, paints, brushes, oily rags or other such materials should be provided.

Gasoline, benzine and other highly volatile liquids should be kept in approved automatically self-closing dispensers.

The use of gasoline or other highly volatile liquids for washing parts should not be permitted.

Buckets with stirrup pumps or soda acid extinguishers are satisfactory for general situations. If they are exposed to freezing, the charge should be protected by an antifreeze agent.

Foam type extinguishers offer good protection. They are particularly effective on oil fires such as in auto shops. They should be protected from freezing.

Carbon tetrachloride extinguishers are particularly useful on electrical and small oil fires. They should not be used in confined spaces since the vapors are toxic. These extinguishers are not subject to freezing.

**Classroom:** Individual shops do not require classrooms. Where a number of shops are involved, a small classroom for common use is desirable.

**Offices:** An office for the teacher in each shop is not generally required. Schools with a number of shops may require an office for the shop director.

#### The General Shop

Number of pupils: twenty

Location: grade level, adjacent to agriculture room  
 Floor area: 1200 to 1600 square feet, minimum 60 square feet per pupil

Floor surfaces: as noted

Washing: wash tray for four pupils

Gas: desirable

Convenience outlets: six

Power: 3 h.p.

Light intensity: 20 to 30 foot-candles

Ventilation: independent exhaust

Chalkboard: 15 square feet (portable). Tackboard: 15 square feet

Furniture and equipment: \$4,000 to \$6,000

A general shop should provide space and equipment for four practical subjects. The shop described is intended for schools where a full class load will be in attendance most of the time.

In large schools two or more general shops may be required. In this case the four courses of instruction may be parallel in each shop; but consideration should be given to the introduction of a wider range of practical activities. The local authorities should decide at an early date on the courses to be offered.

If motor mechanics or farm mechanics are included, the entire floor should be concrete. If these subjects are not included, the floor may be hardwood. Although forge work may be required in rural centers, it is not likely to be as popular in urban centers. If forge work is included, a concrete slab about 8 feet by 10 feet and a 9-inch flue should be provided.

A grade entrance with an overhead door 10 feet wide is essential if motor or farm mechanics are to be subjects of instruction. If more than one shop is required, the grade entrance is necessary for only one shop. Communication with adjacent shops should be provided for the delivery of materials.

The general shop should be not subdivided into small areas such as drafting or painting. Self-contained cupboards, racks, bins, etc., are suitable for the storage of tools and supplies, which should be kept adjacent to the activity concerned.

#### Shops for Trades and Industries

Specific requirements are suggested for some shops. A similar analysis will indicate the requirements of other shops.

##### Drafting Room

Number of pupils: fifteen

Location: north light, adjacent to shops

Floor area: 600 to 800 square feet, minimum 40 square feet per pupil

Floor surface: linoleum, asphalt tile, hardwood

Convenience outlets: two, one each end of room

Power: allow for blueprint machine

Light intensity on desks: 40 to 50 foot-candles

Chalkboard: 30 square feet. Tackboard: 60 square feet

Furniture and equipment: \$1,500 to \$2,000.

If only one drafting room is required, the floor area

shown will permit the installation of a blueprint or ozalid machine in the room itself. If more than one drafting room is required, a small blueprint room approximately 200 square feet should be provided for common use. If a separate blueprint room is made available, then the maximum size of the drafting rooms can be limited to 600 square feet each.

The amount shown for furniture and equipment includes a blueprint or ozalid machine at an estimated cost of \$500. The cost of equipping additional rooms may be reduced accordingly. Power and, if necessary, water and drains should be installed to suit the equipment selected.

##### Machine Shop

Number of pupils: fifteen

Location: adjacent to other metal working shops

Floor area: 1200 to 1600 square feet, minimum 80 square feet per pupil

Floor surface: Wood block, laminated edge grain plank or equivalent

Washing: wash tray for four pupils

Convenience outlets: six

Power: 20 h.p.

Ventilation: independent exhaust

Gas: desirable

Compressed air: desirable

Light intensity: 20 to 30 foot-candles

Chalkboard: 15 square feet. Tackboard: 15 square feet

Furniture and equipment: \$25,000 to \$35,000

The machine shop requires expensive equipment to offer a course satisfactory to industry. The amount shown will allow for some modern grinding and heat treating equipment.

A 6-inch to 9-inch flue is required to take care of fumes from heat treating. Double doors are required to admit machinery and equipment.

##### Motor Mechanics Shop

Number of pupils: fifteen

Location: grade level

Floor area: 1500 to 2500 square feet, minimum 100 square feet per pupil

Floor surface: concrete (hardened)

Washing: wash tray for six pupils

Convenience outlets: ten

Power: 5 h.p.

Ventilation: as noted

Gas: desirable

Compressed air: required

Light intensity: 20 to 30 foot-candles

Chalkboard: 15 square feet. Tackboard: 15 square feet

Furniture and equipment: \$6,000 to \$10,000

The size of the shop and the allowance for equipment allows for senior work to the point where real service work may be undertaken.

Provision should be made for the installation of an air hydraulic hoist. Pits and ramps are dangerous and

are not recommended. A track and chain fall may also be required. If the structure permits a ceiling in excess of the standard 12-foot height this shop should be favored. This shop requires a grade entrance with an overhead door 10 feet wide. An apron should be provided immediately outside to accommodate cars.

Adequate facilities for cleaning parts are essential. If the cleaning arrangements are such that oil and flammable liquids are discharged into the sewer then a satisfactory oil trap must be provided. Bench tops should be covered with 16-gauge sheet metal. Means of general ventilation also should be provided. In addition, several *independent* outlets should be provided to carry exhaust fumes from running engines safely out of the building. An area immediately inside the grade entrance should be graded to a floor drain, to drain off vehicles brought into the shop during inclement weather.

#### **Aero Mechanics Shop**

The general requirements for this shop are much the same as those for motor mechanics. A hoist would not be required. A larger door to grade entrance is necessary.

The shop in the first instance would probably be used for both engine and airframe mechanics. This would mean a rather restricted program due to the bulk and variety of working equipment and the limited floor space.

The adoption of this subject should be most carefully considered. It is likely that separate shops specializing in the two main branches of the trade would be required to institute an effective program.

#### **Welding Shop**

Number of pupils: fifteen

Location: adjacent to sheet metal

Floor area: 1200 to 1600 square feet, minimum 80 square feet per pupil

Floor surface: concrete (hardened)

Washing: wash tray for six pupils

Convenience outlets: four

Power: 50 h.p.

Ventilation: as noted

Gas: required

Compressed air: desirable

Light intensity: 20 to 30 foot-candles

Chalkboard: 15 square feet. Tackboard: 15 square feet

Furniture and equipment: \$5,000 to \$7,000

Because this is a particularly noisy shop it should be located in an isolated part of the building. Acoustic material is desirable on the ceiling and walls. The ceiling should be 14 feet to 16 feet.

A grade entrance with a door 8 feet wide should be provided. An overhead track with a one-ton chain fall is desirable immediately inside the door for receiving and shipping purposes.

Provision should be made for both acetylene and electric welding. A flue 9 inch by 9 inch should be provided for a blacksmith's forge.

Ventilation is most important. A complete system should be installed to suit the equipment and so arranged to take fumes away immediately from each work station. This installation may not be included in the building contract, in which case a flue 13½ inches to 18 inches should be built into the structure, and a collar left for connection at a later date.

Much of the equipment in the way of racks, bins, benches, cubicles, etc., may be built in the school. Manifolding systems for acetylene and oxygen present a hazard and are not recommended.

#### **Electric Laboratory**

Number of pupils: fifteen

Location: adjacent to electric installation

Floor area: 1200 to 1400 square feet, minimum 80 square feet per pupil

Floor surface: wood block, laminated edge grain plank, or equivalent

Washing: wash tray for four pupils

Convenience outlets: four

Power: 10 h.p.

Gas: desirable

Light intensity: 20 to 30 foot-candles

Chalkboard: 60 square foot. Tackboard: 15 square feet

Furniture and equipment: \$6,000 to \$10,000

If the school is not large enough to justify this shop then arrangements may be made to include a limited range of laboratory work in the electric installation shop. In this case, the estimate for furniture and equipment for the electric installation shop may be increased by \$2,000 to \$3,000.

Various potentials and frequencies will be required. Equipment in the way of motors, generators, frequency changers, transformers, switchboards, may be installed in the laboratory for experimental and test purposes. This class and kind of equipment is not included in the building contract, neither is it intended as part of the operating system of the school in general.

Some of the equipment in this shop can be built in the school if a proper selection of motors, generators, transformers, switches, meters, fittings, etc., are purchased as equipment.

Potentials and frequencies generated in this shop may be made available to the electric installation shop and the radio laboratory.

Bench accommodation 36" high with transite tops should be provided for a class of 15 pupils. Swing stools attached to the benches at each work station may be provided.

Each work station should be provided with convenience outlets for 110/60 and 110 d.c. Further outlets with other frequencies and potentials may be added.

#### **Radio Laboratory**

Number of pupils: fifteen

Location: adjacent to electric laboratory and science rooms



Floor area: 1200 to 1400 square feet, minimum 80 square feet per pupil

Floor surface: Linoleum, asphalt tile, hardwood

Washing: wash tray for four pupils

Convenience outlets: as noted

Power: 10 h.p. (or 15 h.p. if a transmitter is to be included)

Light intensity: 20 to 30 foot-candles

Chalkboard: 60 square feet. Tackboard: 15 square feet

Furniture and equipment: \$8,000 to \$12,000

Radio laboratories, which may be required in the larger schools, can be served by the potentials and frequencies generated in the electric installation shop or electric laboratory. Some provision may be made for a limited range of radio work in small schools by setting aside some space in the electric installation shop or in the electric laboratory.

Bench accommodation 36 inches high with transite tops should be provided for a class of fifteen pupils. Swing stools attached to the benches at each work station may be provided. Drawers or lockers suitable for the storage of sets under construction are essential. The space under the benches may be used for this purpose. Some of the equipment in this shop can be made in the school provided that meters, panels, coils, condensers, and essential main units are bought as equipment. Each work station should be provided with ground and aerial connections. Convenience outlets for 110/60 and 110 d.c. should be set up for each work station. Further outlets with other frequencies and potentials may be added.

#### Wood Shop and Mill

Number of pupils: fifteen

Location: grade level, isolated if possible

Floor area: 1500 to 2500 square feet, minimum 100 square feet per pupil

Floor surface: wood block, laminated edge grain plank, hardwood

Washing: slop sink

Convenience outlets: four

Power: 20 h.p.

Ventilation: as noted

Gas: desirable

Light intensity: 20 to 30 foot-candles

Chalkboard: 15 square feet. Tackboard: 15 square feet

Furniture and equipment: \$10,000 to \$14,000

The size indicated is sufficient for one combination shop. Additional shops, set up as wood shops and all using the same mill equipment, should have a floor area of 1,200 to 1,400 square feet. They may be equipped for approximately \$2,000 to \$3,000. The wood shop and mill require a grade entrance with a door 10 feet wide. Additional wood shops require passageway for the admission of machinery and equipment. A 16-foot ceiling is desirable.

Machines should be connected to an exhaust system and floor sweeps placed at strategic points for waste

removal. The waste may be discharged in the boiler room if the mechanical plant is arranged for this purpose. Or, a cyclone can be installed outside the building, arranged for easy unloading and located so that the noise will not disturb classrooms.

A small tightly enclosed paint room about 100 square feet is desirable. It should be independently ventilated. This room may service a number of wood shops and the pattern shop in which case the area should be increased accordingly. The benches and cabinets in this room should be made of metal.

#### Pattern-Making Shop

Number of pupils: fifteen

Location: adjacent to mill room and wood shop

Floor area: 1200 to 1600 square feet, minimum 80 square feet per pupil

Floor surface: wood block, laminated edge grain plank, or hardwood

Washing: slop sink

Convenience outlets: four

Power: 10 h.p.

Ventilation: as noted

Gas: required

Compressed air: required

Light intensity: 20 to 30 foot-candles

Chalkboard: 30 square feet. Tackboard: 15 square feet

Furniture and equipment: \$6,000 to \$10,000.

About 20 per cent of the floor area should be concrete. This area can serve as an experimental foundry for testing and proving purposes. The foundry should be equipped with skeleton equipment for small work, complete with a gas or electric core oven and melting pot to handle white metals. A 9-inch flue should be built into the structure. Machines should be connected to an exhaust system which may be connected to the mill system. Floor sweeps should be furnished at strategic points.

#### Cabinet-Making Shop

Number of pupils: fifteen

Location: adjacent to mill room

Floor area: 1200 to 1600 square feet, minimum 80 square feet per pupil

Floor surface: wood block, laminated edge grain plank, or hardwood

Washing: slop sink

Convenience outlets: four

Power: 15 h.p.

Ventilation: as noted

Gas: desirable

Compressed air: required if spray painting is to be used

Light intensity: 20 to 30 foot-candles

Chalkboard; 30 square feet. Tackboard: 15 square feet

Furniture and equipment: \$5,000 to \$7,000

(The inclusion of upholstery is desirable in this subject.)

Machines should be connected to an exhaust system

which may be connected to the mill system. Floor sweeps should be provided at strategic points. The paint and finishing room mentioned for the wood shop and mill may be used. If spray painting is required, either a common paint room should be arranged for this purpose or a special spray paint room provided.

The spray paint room should be fireproof and equipped with an automatic self-closing door. All electrical equipment—motors, fans, switches, lighting fixtures—must be vapor-proof. Electrically operated clocks, bells, or phones should not be installed in this room. The booth should be easy to clean; sharp internal corners should be avoided. The floor of the booth should be zinc or other inert easily-cleaned material. The installation should comply with the requirements of the fire underwriters.

#### Print Shop

Number of pupils: fifteen

Location: adjacent to shops; and if possible, to English classrooms

Floor area: 1200 to 1600 square feet, minimum 80 square feet per pupil

Floor surface: wood block, laminated edge grain plank, or equivalent

Washing: wash tray for four pupils

Gas: required

Compressed air: desirable

Convenience outlets: six

Power: 10 h.p.

Light intensity: 40 to 50 foot-candles

Chalkboard: 15 square feet. Tackboard: 30 square feet

Furniture and equipment: \$10,000 to \$15,000

This subject is intended to provide for both composition and presswork. The amount shown for equipment will provide for a modest installation. The establishment for complete printing instruction is very costly and would require at least two shops: one for hand and machine composition and the other for pressroom work. In this event the space and amount for equipment would have to be doubled.

A print shop to suit the convenience of the school would not be considered as a shop offering satisfactory training for entry to the trade.

Double doors are necessary to admit machinery and equipment.

#### Watch Repair Shop

Number of pupils: fifteen

Location: remote from dust, vibration, corrosive fumes

Floor area: 900 to 1,200 square feet, minimum 60 square feet per pupil

Floor surface: linoleum (solid color, avoid marble patterns)

Convenience outlets: six

Washing: work sink

Power: 2 h.p.

Light intensity: 50 foot-candles

Gas: desirable

Chalkboard: 30 square feet. Tackboard: 15 square feet

Furniture and equipment: \$6,000 to \$8,000

Light, both natural and artificial, is most essential. A cold cathode installation immediately over the benches may be considered in place of individual lights at each bench. Benches and seats, too, are important. They should be purchased from reputable supply houses or made to detail as required. Each bench should be provided with a linoleum top (light color) and with a convenience outlet for a jeweler's lathe.

Considerable storage for small parts and work in process is required. Conveniently located drawers varying in depth from 1 inch to 4 inches, in tower form, are useful. A small enclosed section should be set aside for hard soldering, heat treatment, light forging, etc. This area should be ventilated and arranged to keep fumes, etc., out of the main shop.

#### Shops for the Building Trades

Shops which will offer sufficient space for practical instruction covering the full range of work in the various building trades are almost impossible to set up. This fact, as well as the quantity and cost of materials and the disposal of the fabricated product, should be considered carefully before these shops are established.

Two alternative methods of establishing building trades training are suggested as follows:

(1) Purchase a conveniently located site upon which structures may be erected by the pupils in the trades concerned. When the structures are completed they should be used or disposed of in whatever manner will meet with local approval. Such an arrangement would require the cooperation of business, labor, and municipal building authorities. As sites are built up, further sites would be acquired. Classroom and related subjects could be taught in a building on the site, or classes could be held in a centrally located school. The program would have to take the exigencies of inclement weather into consideration.

(2) Make apprenticeship arrangements with the trade concerned which would permit the pupil to work in the trade and attend school on a part-time basis. If this is done, then close cooperation will be necessary between the trade and school to determine both the theoretical and practical subject matter. If such arrangements are made, shops for carpentry, sheet metal, electric installation, bricklaying, plastering, plumbing, steamfitting, painting and decorating may be set up as described.

#### Carpentry Shop

Number of pupils: fifteen

Location: adjacent to wood shop and mill

Floor area: 1,500 to 2,500 square feet, minimum 100 square feet per pupil

Floor surface: wood block, laminated edge grain plank or equivalent

Ceiling height: 16 to 20 feet

Washing: slop sink  
 Convenience outlets: four  
 Gas: desirable  
 Light intensity: 20 to 30 foot-candles  
 Chalkboard: 15 square feet. Tackboard: 15 square feet

Furniture and equipment: \$3,000 to \$4,000

This shop is intended for bench and erection work. Fixed power equipment is unnecessary. Portable skill saws and other power devices commonly used on the job may be required.

A door 8 feet wide is necessary to grade entrance for the delivery of material and the removal of completed structures. Consideration may be given to an outside area adjacent to the shop for the erection of structures during suitable weather. Dry and finished lumber may be stored within the shop. Rough lumber may be stored outside in convenient shelters.

#### Sheet Metal Shop

Number of pupils: fifteen  
 Location: adjacent to welding  
 Floor area: 1,200 to 1,400 square feet, minimum 80 square feet per pupil  
 Floor surface: wood block, laminated edge grain plank, or equivalent  
 Washing: wash tray for four pupils  
 Convenience outlets: four  
 Power: 1 h.p.  
 Ventilation: independent exhaust  
 Gas: required  
 Light intensity: 20 to 30 foot-candles  
 Chalkboard: 60 square feet. Tackboard: 15 square feet

Furniture and equipment: \$3,000 to \$4,000

This is a noisy shop and should be located, if possible, in an isolated part of the building. Acoustic materials on the ceiling and walls are desirable. Benches which are used for soldering work should be covered with  $\frac{3}{8}$  inch transite.

#### Electric Installation Shop

Number of pupils: fifteen  
 Location: adjacent to electric laboratory  
 Floor area: 1,200 to 1,800 square feet, minimum 80 square feet per pupil  
 Floor surface: wood block, laminated edge grain plank, or equivalent  
 Washing: wash tray for four pupils  
 Convenience outlets: four  
 Power: 10 h.p.  
 Gas: desirable  
 Light intensity: 20 to 30 foot-candles  
 Chalkboard: 30 square feet. Tackboard: 15 square feet

Furniture and equipment: \$4,000 to \$7,000

If the design of the building affords an opportunity to secure a high ceiling, this shop should be given a 16- to 20-foot ceiling, desirable for the installation of wiring structures.

Various potentials and frequencies will be required. Equipment in the way of motors, generators, frequency changers, transformers, may be installed within the shop for student use. This class and kind of equipment is not included in the building contract. Neither is it intended as part of the operating system of the school in general.

Potentials and frequencies generated in this shop may be made available to the electric and radio laboratories.

#### Bricklaying Shop

Number of pupils: fifteen  
 Location: adjacent to plastering shop  
 Floor area: 1,200 square feet to 2,000 square feet, minimum 80 square feet per pupil  
 Floor surface: concrete  
 Ceiling height: 16 to 20 feet  
 Washing: wash tray for four pupils  
 Convenience outlets: two  
 Ventilation: independent exhaust for dust  
 Light intensity: 20 to 30 foot-candles  
 Chalkboard: 15 square feet. Tackboard: 15 square feet

Furniture and equipment: \$1,000 to \$2,000

This shop can be combined conveniently with the plastering shop. A door 8 feet wide to grade entrance is necessary for delivery of materials and removal of debris. A water supply and a floor drain with an effective sand trap should be provided. Essential supplies which require dry storage may be stored within the shop. Bulk supplies of brick and tile may be stored outside in convenient stock piles or shelters. Consideration may be given to an outside area adjacent to the shop for work experience in suitable weather.

#### Plastering Shop

Number of pupils: fifteen  
 Location: adjacent to bricklaying shop  
 Floor area: 1,200 to 2,000 square feet, minimum 80 square feet per pupil  
 Floor surface: concrete  
 Ceiling height: 16 to 20 feet  
 Washing: wash tray for four pupils  
 Convenience outlets: two  
 Ventilation: independent exhaust for dust  
 Light intensity: 20 to 30 foot-candles  
 Chalkboard: 15 square feet. Tackboard: 15 square feet

Furniture and equipment: \$1,000 to \$2,000

This shop can be combined conveniently with the bricklaying shop since the same water supply, storage, etc., requirements should be met for each.

#### Plumbing Shop

Number of pupils: fifteen  
 Location: adjacent to sheet metal and steamfitting shops  
 Floor area: 1,200 to 1,500 square feet, minimum 80 square feet per pupil



Floor surface: concrete  
 Ceiling height: 16 to 20 feet  
 Washing: wash tray for four pupils  
 Convenience outlets: four  
 Ventilation: independent exhaust  
 Gas: required  
 Compressed air: desirable  
 Light intensity: 20 to 30 foot-candles  
 Chalkboard: 30 square feet. Tackboard: 15 square feet

Furniture and equipment: \$4,000 to \$5,000

Floor drains should be installed at a number of points so that water may be discharged from experimental projects. Bench tops should be covered with  $\frac{3}{8}$  inch transite. Gas should be distributed to each bench for plumbers' gas stoves. Plumbing projects may be installed in structures built in other building construction shops and outside areas.

#### Steamfitting Shop

Number of pupils: fifteen  
 Location: adjacent to plumbing shop  
 Floor area: 1,200 to 1,500 square feet, minimum 80 square feet per pupil  
 Floor surface: concrete  
 Ceiling height: 16 to 20 feet  
 Washing: wash tray for four pupils  
 Convenience outlets: four  
 Ventilation: independent exhaust  
 Gas: required  
 Compressed air: desirable  
 Light intensity: 20 to 30 foot-candles  
 Chalkboard: 30 square feet. Tackboard: 15 square feet

Furniture and equipment: \$4,000 to \$5,000

Floor drains should be installed at a number of points so that water may be discharged from experimental projects. At least two flues suitable for domestic type boilers should be provided. A steam supply from the boiler room may be desirable. If this is done a shut-off valve and gauge should be installed. Steamfitting projects may be installed in structures built in other building-construction shops and outside areas.

#### Painting and Decorating Shop

Number of pupils: fifteen  
 Location: remote from dusty activities  
 Floor area: 1,200 to 1,500 square feet, minimum 80 square feet per pupil  
 Floor surface: hardwood  
 Ceiling height: 16 to 20 feet  
 Washing: wash tray for four pupils  
 Convenience outlets: four  
 Ventilation: independent exhaust  
 Compressed air: desirable (essential if spray booth required)  
 Light intensity: 20 to 30 foot-candles  
 Chalkboard: 15 square feet. Tackboard: 15 square feet

Furniture and equipment: \$3,000 to \$5,000

Steel cabinets for storage of inflammable materials is essential. If a spray paint booth is required, it should meet the same requirements as the spray paint room in the cabinet making shop.

#### Farm Shop and Agricultural Room

Agricultural work usually requires both shop and classroom facilities. In some cases classroom accommodation can be found in a regular classroom and the general shop may be used as a farm shop. If the facilities are not available or satisfactory then consideration may be given to special areas as described.

#### Agricultural Room

Number of pupils: twenty  
 Location: south exposure, adjacent to farm shop, general shop, or science room  
 Floor area: 600 to 800 square feet, minimum 30 square feet per pupil  
 Floor surface: asphalt tile, hardwood  
 Gas: desirable  
 Convenience outlets: four  
 Light intensity: 20 to 30 foot-candles  
 Chalkboard: 60 square feet. Tackboard: 15 square feet

Furniture and equipment: \$2,000 to \$2,500

This room should be equipped with benches or tables for students and a teacher's demonstration bench. The tops of the benches should be acid resisting. The teacher's bench should be provided with a sink, hot and cold water, electric outlets, and gas if available. It may be used as an auxiliary science room in which case adjustments to size will be required.

A storeroom (100 square feet) should be added at the teacher's end of the room with convenient access to the classroom. A grade entrance from the storeroom to an outside garden plot is required. A water supply and drain may be provided for the installation of an aquarium (6 to 8 cubic feet). A growing bench should be installed at sill height along the window wall of the main room. The bench should be lined with non-corrosive material and water supply and drain provided.

A small greenhouse (100 to 150 square feet) may be desirable. The greenhouse should be accessible from the classroom. It should be provided with a water supply, floor drain and independent heating. Convenient access should be arranged to the farm shop or to the general shop.

#### General Farm Shop

Number of pupils: twenty  
 Location: adjacent to agriculture room and to general shop  
 Floor area: 1200 to 1600 square feet, minimum 60 square feet per pupil  
 Floor surface: concrete  
 Washing: wash tray for four pupils  
 Gas: desirable

Convenience outlets: six

Power: 3 h.p.

Light intensity: 20 to 30 foot-candles

Ventilation: independent exhaust

Chalkboard: 15 square feet (portable). Tackboard: 15 square feet

Furniture and equipment: \$2,000 to \$4,000

A general farm shop should provide space and equipment for woodworking, metal-working and a central area for construction work and the servicing of farm vehicles and machinery. Forge work is usually included in farm mechanics in which case a 9-inch flue is necessary. A grade entrance with a door 10 feet wide is essential for the admission of farm vehicles.

This shop should not be subdivided into small areas. Self-contained cupboards, racks, bins, etc., are suitable for the storage of tools and supplies which should be kept adjacent to the various activities concerned. It may be desirable to establish the farm shop as a self-contained unit apart from the school proper so that it may be more convenient to the agricultural plot.

#### **Specialized Farm Shops**

In localities where there may be special emphasis on certain branches of farm mechanics or agriculture then special shops may be built and equipped and operated on a similar basis as that described for trades and industry shops.

# IS THAT SWIMMING POOL WORTH MODERNIZING?

By CHAUNCEY A. HYATT

Swimming Pool Consultant, Chicago

RECENT trends in swimming pool sanitation and operation have raised the question of whether that pool built back in the twenties can have its face lifted or even a major operation and take its place among modern pools with the standards now demanded by public health authorities.

Most pools built during this period and even later, are oversize. They also either lack entirely, or have what is now considered inadequate water treatment. Most of them have poor inlet arrangement with certain portions of the pool receiving more than their share of "new" water and other sections getting far too little.

## Proper Filtering Essential

When water treatment (filters) had been included, the area was usually so small and the turnover so slow that clarification was little more than a gesture.

To make up for lack of filters, health authorities have demanded that more and more chlorine be added until many pools resemble a "sheep dip" or chemical bath. Disinfection without adequate filtration is no more logical than using perfumes in personal hygiene and minimizing or eliminating one's bath or shower.

Unless these oversize pools can be cut down in size it will be uneconomical to install equipment to provide a six-, or eight-hour turnover now demanded by nearly all public health authorities. Unless cut down in size the cost of operation will be uneconomical even disregarding the installation cost of the equipment.

In many cases it will be more satisfactory to junk the old pool and start all over again. Of course, in some cases it may be possible to install the new type

diatomite filters and get a few more years of service, then use this new equipment on a modernly designed pool with almost complete salvage of the recirculation system. Diatomite type filters take up very little space and their operation is very simple.

Where these old pools now have a limited amount of recirculation with the conventional type of pressure or gravity filter, it is good economy to retain this system in its present form and add the diatomite type filters as a separate system providing such additional filter area as is necessary to meet present-day requirements. Of course, these existing filters should be re-conditioned to operate to their full capacity. This can be done now in most cases by new methods of chemical treatment.

In many cases, the contour of the old pool is very poor with too much extremely shallow water and with inadequate depth for diving safety. Pool contours have progressed probably as much as those of automobiles or airplanes and it is usually difficult to change concrete structures to meet present-day standards.

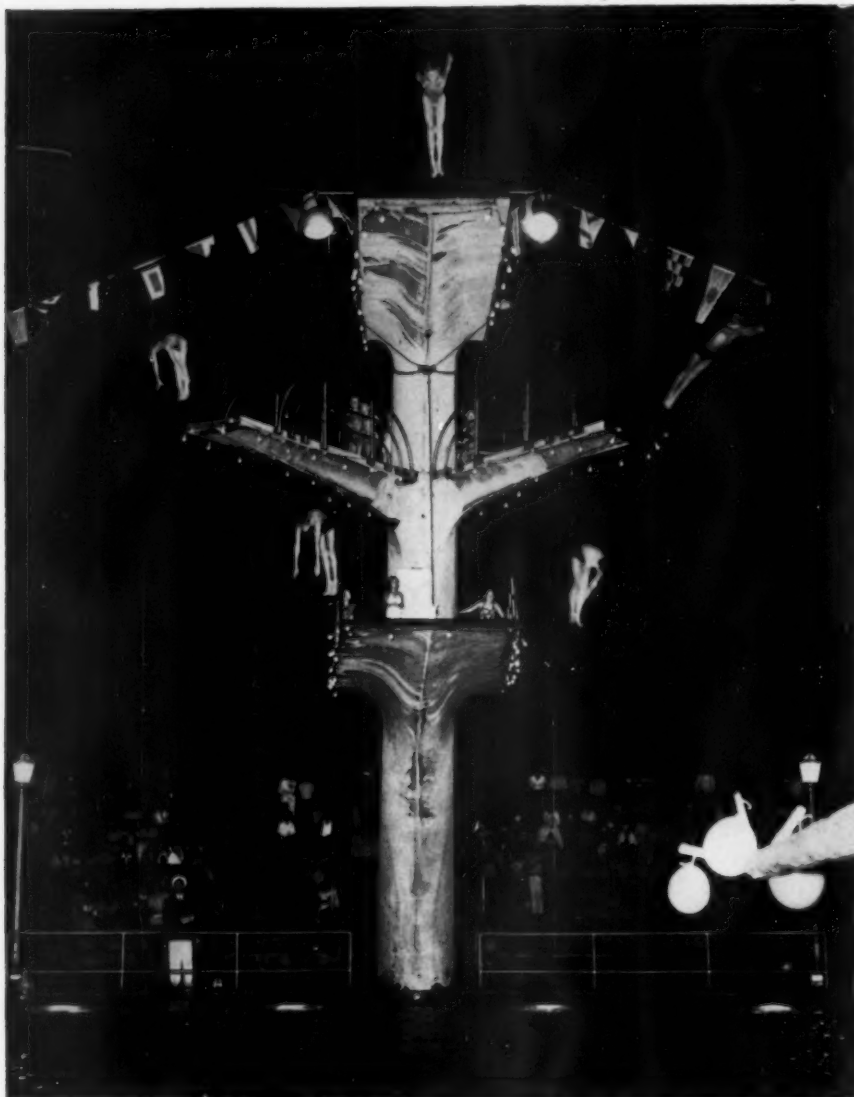
## Depth Arrangement

Deep water is needed only for diving, and any deep water not immediately adjacent to the springboards or diving platforms is not only uneconomical in the use of structure and water but represents a hazard from a physical safety standpoint. Sometimes depth arrangement can be greatly improved by constructing an overflow around the entire pool and raising the water level one or two feet.

Just as deep water is undesirable except where it is required for diving, so is extremely shallow water.

\* Material published in *Parks and Recreation*, June, 1948.



*Courtesy of New York Park Department*

Elaborate reinforced concrete diving stand at Astoria Pool, New York City.

Water less than three feet deep belongs in a separate wading pool. The useful or popular depth lies between three and five feet and the well designed pool provides a maximum area of this depth.

Extremely shallow water (less than three feet) is definitely a liability from the standpoint of water treatment because under a hot sun this shallow water heats to a high temperature and chlorine residuals will dissipate rapidly. While bromine will stand higher water temperatures and is less affected by sunlight it, too, is under a handicap under these conditions.

Before doing extensive remodeling or junking an old pool it will pay to obtain the services of a specialist in this particular field and profit by his experience.

Where concrete walls or floors are in bad shape it is usually poor economy to attempt to repair them. However, each pool is a special problem and must be

judged on its own merits and handled individually.

In revamping the dressing areas, the floors usually represent the most distressing problem. Floors should pitch, preferably in a flat plane to drains so that they can be cleaned easily. Floor pitch (3 inches in 10 feet) should be adequate so that puddles of water will not accumulate.

Overflows (scum gutters) present a major problem on most old pools. In some cases they are lacking entirely or are of the "recessed" variety and very unsatisfactory. In some cases, where they are lacking, the top edge of the pool can be converted into an overflow.

Pool walks are another big problem and are seldom satisfactory on old pools. They should pitch, preferably away from the pool, with adequate slope (3 inches in 10 feet). When rebuilt they should be made non-slip with a "suction" or "carpet" finish.

Where water costs are excessive or where the water

Old man winter designed some expansion joints of his own!



supply contains undesirable qualities such as heavy iron content, "closed" system design of the recirculation should be used. Temperature control can be added to many old-time pools without excessive cost and greatly increases their popularity.

"Upward flow" recirculation sometimes solves a problem in an old pool where soot, leaves, dust, etc., have been objectionable, by floating off this material continuously. "Shotcrete" has been used in modernizing pools with some, or all, of the old walls or structure used as forms or bases for the new finish. In revamping an old pool where the pool walks are poor, it may be well to excavate an "access" trench or tunnel entirely around the pool as is now provided on well designed pools.

Painting old pools with the modern specialized

paints is unsatisfactory unless the old surfaces are sandblasted. Sandblasting is an expensive job and in many cases funds could be expended to better purpose on other items. Of course, a good paint job does a lot for a pool to improve its appearance and discourage the growth of algae and slime.

#### Cleaning Up the Patrons

Most old-time pools had inadequate provision for cleaning up the patrons before allowing them in the pool area. Plenty of warm water and soap and enforcement of the nude shower regulation can be accomplished with a minimum of attendants and supervision. Almost without exception, every health authority in civilized areas lists a nude shower with warm water and soap as a prerequisite to entrance to a pool, yet



\$30,000 down the drain.



Recessed overflow—hard to clean.

few public or municipal pools are so designed, or operated as to live up to this basic or common-sense regulation.

Probably the failure to provide showers and supervision to enforce their use by patrons, has done more than anything else to handicap the sport of swimming and raise doubt in the minds of serious observers as to whether a swimming pool can be anything but a big community bathtub.

While the record has not too much evidence against swimming pools as a source of disease and infection, it is very difficult to believe that this is true when one sees the conditions which exist in many public pools.

After a lifetime spent in close association with pools of almost every type, as a swimmer, operator, and public health official, the writer would rather swim and have his family swim in a pool where an honest attempt is made to clean up the patrons, than in a pool where bather preparation is a gesture and the water is loaded to the limit with disinfectants. If these uncomfortable and unpleasant disinfectants really gave the protection claimed by their sponsors it would not be quite so bad, but they do not unless clarification is also provided.

As clarification (filters) becomes adequate and turnovers are increased the need for disinfection becomes less and less. Although bromine is superior to chlorine in almost every respect for pool disinfection, it is a poor substitute for soap and warm water showers, or an adequate filter system.

A pool soon sinks to the level of its least desirable patron! Provide adequate showers and, if necessary, redesign the old bathhouse so that proper bather pre-cleansing can be enforced with a minimum of help and effort before spending a lot of money on less necessary items.

Baffle gates can be used to control patrons and cut down personnel. They can be "one way" type or the "controlled" variety.

#### Other Sanitation Features

In modernizing old water treatment equipment it will be well to junk many of the obsolete gadgets that have little or no function. The continued use of ammonia with chlorine disinfection which results in the formation of chloramines is discouraged by almost everyone except the folks who sell this equipment.

The old-style alum pots invented back in 1870 by John Wesley Hyatt should be replaced by open-type

feeders which can be improvised by any handy mechanic for a few dollars. The design of these simple type open feeders can be obtained from any wide-awake state health department for the asking.

Cross connections between the pool recirculation system and potable supply usually exist on the older pools and are a source of anxiety to sanitary engineers and public health authorities. Solution of this problem is simple as far as eliminating the cross connection, but the after results on the pool often are unfortunate. Unless the pool recirculation pump can provide sufficient volume of backwash water to clean filter beds properly, filters are liable to suffer.

To backwash properly the old-style pressure or gravity filter, *five times* the normal volume of water must go through it. Of course even with a cross connection to the city supply the volume may not be sufficient to clean the filter beds, in which case "breaking" the cross connection will not make much difference.

With one or two filter units the best solution will be to use a "swinging flange." This will eliminate the cross connection at all times except when actually backwashing the filters, and will enable the operator to do as much good in the backwashing operation as he has ever been able to do. A swinging flange on old pools is acceptable to most progressive health departments but would not be satisfactory on pools designed at the present time.

If the pool has three or more filter units, a surge tank of proper size is the proper solution. Elimination of cross connections to sanitary sewers is even more important, but is more difficult to accomplish in most cases. It may be necessary in some cases to provide a sump and pumps to lift the water out of this sump with a free fall into the sewer.

#### The Pool Area

Pools of ancient vintage can be greatly improved by eliminating sand or grass areas around them. *"It is very difficult to keep dirt clean!"* And sand and grass are the equivalent of dirt. These areas should be eliminated or fenced off and patrons required to pass through the shower room before again gaining entrance to the pool.

In general the renovation of poorly designed pools is an expensive and unsatisfactory procedure and should be given considerable time and study by someone experienced in this sort of thing and honest enough not to spend money on a pool which is a "dead duck."



## PLANNING SCHOOL FLOORS

By J. J. COLLINS

Rye, New York, Public Schools



Mr. Collins was educated at Plattsburg State Teachers College, New York University, and Princeton, and at present he is working for his Ed.D. at New York University. He has been connected with schools and education for 23 years. He is the Principal of an elementary school in Rye, New York, and is a member of the Administrative Council which operates the Rye public schools in lieu of a superintendent of public schools.

**T**OO little attention has been paid to the selection of flooring material as evidenced by the dearth of material on the subject.

The flooring in any school building makes up for a large part of the construction costs. The maintenance of floors throughout the life of the building will take a considerable portion of the general maintenance budget. Floors will do much to give the building a nice appearance as well as keep up a high degree of sanitation. Careful selection of the various types of flooring will give maximum use to the rooms of the building. The type of flooring will have a direct bearing on the type of construction within the building. Light reflection will be an important factor.

### Floor Requirements

What do we want in a school floor? First, if it is a wood floor it must be obtainable. The latest reports of the Maple Flooring Manufacturing Association indicate that the 60 million feet of maple and birch flooring milled during the past fourteen months are but one sixth of the required demand. Also, this amount of board feet does not necessarily mean top grade lumber nor does it mean that the flooring has been thoroughly dried.

Second, the floor should be reasonably noiseless.

Third, it should be comparatively easy to maintain and repair. It should be the type that the average custodian can clean thoroughly without too much technical knowledge. Once sealed, waxed, or washed, the floor should merit a satisfactory sanitation standard. Further, it should not require special costly applications. Schoolmen have come to consider asphalt tile floors as the easiest to repair, because new tiles can be inserted to replace worn ones.

Fourth, it should be resilient, yet it should have sufficient rigidity to provide safety and stability.

### Rigidity Essential

Fifth, it should be durable and should not receive the impressions of weighty objects too easily. This is one of the faults of linoleum, asphalt and rubber tiles, and in some cases pine. Asphalt tile manufacturers have concentrated on developing a hard surface for their product, but this has rendered the tile brittle.

Sixth, flooring should be reasonably economical; not only in the cost of the material itself but also in labor costs.

Seventh, the floor should have a pleasant appearance, one in keeping with the use of the particular room. Asphalt tiling and linoleum lend themselves readily to design in various rooms.

Eighth, flooring should be relatively safe from slipping. It should have a smooth surface that is neither porous nor susceptible to stains.

### Wood Flooring

Wood floors are generally divided into two classes: hardwood and softwood. Of hardwood floors, perhaps the most frequently used are pine and maple. Of the

two, maple will be found in most buildings which have been built within the last 25 years.

There are two other classes of hardwood-softwood floors: quartered oak and fir. Because they splinter and stain easily, both woods are poor for classroom use unless used as sub-floors.

Birch floors are in the same class as maple. Birch and maple flooring if properly laid will outlast the building.

Some manufacturers are now producing pecan wood floors. This type of wood has not been given enough trial to determine its full merits, but considerable claims are made for its durability, ease of maintenance and attractiveness.

#### **The Hazard of Dampness**

The presence of moisture is one of the greatest difficulties with wood floors. If the new-milled stock has not been properly dried, it will warp, spread and twist. The same will happen if flooring properly dried is installed over an area where moisture is heavy.

On the other hand, if the floor is installed so that it cannot "breathe," it will dry-rot regardless of its quality.

Wood floors are warm, resilient and reasonably quiet. They do not show marks or scars. Installation costs are less than for many other types of flooring. However, wood floors are expensive to maintain, do not retain a good appearance and require frequent waxing. Worn floors are dangerous because of splinters and uneven surfaces. They are somewhat noisy and can develop squeaks, particularly in frame buildings. Although the last seems to belie a previous advantage, it is mentioned here because the noise can be controlled.

#### **Well Seasoned Sub-floors**

Wood floors generally require a sub-floor of well seasoned wood. Generally, a small space is left between the boards for expansion. The sub-floor is covered with a building paper of 15-pound asphalt-saturated roll felt to absorb moisture.

The finish floor should not be delivered to the building until all parts of the construction are dry. Wood flooring absorbs moisture and dry lumber will cup and buckle if brought into a damp building.

Flooring strips should be laid lengthwise, if possible. The grain of the wood should run with the heavy traffic. Cut nails are generally used in the laying of hardwood flooring. Expansion space should be left at all sides of the room. Where flooring is to be installed in fire-resistant construction the sub-floor sleepers (either two-by-eights, or three-by-eights or tens) are placed 12 to 16 inches apart with concrete cinder fill between. Sometimes a special mixture of nailing concrete is troweled up to floor level. It must be allowed to dry for several weeks before being covered with building paper. Then the flooring is nailed directly to the material.

End-grain hardwood block is used in gymnasiums

and where great loads are expected. It is laid over the concrete sub-floor in mastic cement. This type of flooring will buckle in the summer and settle in the winter months. Some installations will allow the floor "elbow room" of as much as four inches along the sidewalls. In spite of precautions blocks must be removed from time to time to prevent buckling, especially where there is moisture below the floor.

#### **Masonite and Steel Spline**

Another type of flooring is masonite tile, which is made of wood chips exploded under high pressure and compressed into boards. These boards are laminated in somewhat the same fashion as plywood. This type of flooring is expensive but presents a hard surface and has long-wearing qualities.

The steel spline insert is another installation method. It is fitted with locking bars and driven between the hardwood floor boards. This installation is made in places where dampness is suspected.

Parquet flooring is squares of wood backed with canvas. Each square is made of a series of small boards in six-inch or eight-inch lengths. Installation of this flooring requires trained specialists. While it produces an attractive appearance, the cost of installation and maintenance does not warrant its use in school buildings.

#### **Sanding and Edging Methods**

After the flooring is laid it should be swept clean with a dry brush; no water should be used. It is then sanded with a roll-type machine. A rough cut should be first applied diagonally across the floor followed by a with-the-grain cut. The paper should be changed to a finer grit and again sanded with the grain.

There are a number of good edging machines which will cover the parts of the room where a large machine will not reach. Sometimes this edge-scraping job is done by hand, but this is very expensive. When the floor is in this stage it should be swept clean of all abrasives and should not be walked upon.

Floor seals are generally applied with a large seal mop in two or three coats, depending upon the porosity of the wood. After the last coat is allowed to dry thoroughly, a steel wool braided pad attached to a rotary polishing machine will eradicate all excess seal material. The floor can be maintained with good water wax and dry sweeping.

#### **Stone Flooring**

Masonry floors are grouped into three classes: natural stone, manufactured stone and clay products. Marble is the most commonly used natural stone, and is of two general types Vermont, which is smooth and dense; and Georgia and Tennessee, which is granular in texture. Slate and travertine make attractive floors but are not satisfactory.

Steel construction in buildings has removed many of the disadvantages of marble. Marble is fireproof and very durable. It is comparatively low on mainte-

nance but is expensive to install and when damaged requires a skilled repairman.

The sub-floor is set at a level of two or three inches below the finished grade. A thin layer of dry sand is spread over the rough floor, furnishing a solid bearing for the marble block, allowing for evening of deficiencies in construction and finish, and preventing cracks from expansion and contraction. The tiles are set in stiff mortar which should be of the non-staining variety.

Setting this floor requires a skilled mechanic. When finished, it is tested by striking with a mallet. A hollow sound indicates future trouble spots. Liquid cement forced into holes drilled in the joints remedies the situation. When finished, the marble is ground with a machine using coarse silicon carbide stones. After washing with clear water, the floor is sealed with marble sealer to insure a hard, non-slippery surface.

#### Concrete Pros and Cons

Of all the manufactured stone floors, concrete is the most often used. It is used not only as a floor in itself but as a sub-floor.

Concrete is a mixture of rock, sand and cement. Mixture, composition, curing and finishing decide the quality of the concrete floor. One of the greatest difficulties with such a floor is its tendency to dust as a result of wear. Unless it is properly cared for it will check and pit. This flooring can be colored at installation, thus eliminating continued painting.

Probably the greatest use of concrete in modern building insofar as flooring is concerned is as a sub-floor. Basements and corridors, storage rooms and locker rooms where there is matting laid on the floor are also constructed from this material. It is fire-proof and comparatively easy to install, not requiring any skill such as the laying of tiles, etc. There is a tendency to use a form of concrete flooring in large blocks which are pre-cast outside of the building and lowered into the proper place by crane where they are locked by special fittings.

In addition, we find that the present trend in building is to lay the entire floor in one major operation on each level, then set up the divisions of rooms after which the top flooring material is laid. This saves on forms and transportation of material, giving the entire level a clear surface.

We find many office buildings where partitions are provided as desired simply by means of locking devices which have been previously set into the concrete floor.

#### Cellular Concrete

One of the newer ideas is a lightweight cellular concrete made of cement and sand. It is universally honeycombed with blown air cells which makes it light, sound-resistant, fire-resistant and resilient. This removes considerable weight and brings its construction cost down to the level of wood while providing the additional advantages mentioned above. In a six-inch cellular concrete floor, the total weight per

square foot amounts to approximately twenty pounds.

Concrete floors are reasonably inexpensive to install and will give long and hard wear if properly installed and cared for. Unfortunately, they can be noisy and are hard to walk or stand upon. They will bloom if there is moisture underneath.

In spite of the claims of manufacturers, no one seal seems to prevent efflorescence. Smoothness and density are most desirable in laying. Smoothness is acquired from troweling and density from the right mixture. About 45 minutes after the base course is laid, the topping should be placed upon it. It is finished by screeding and troweling. The floor must be kept continuously wet while it is curing for a period of at least ten days. A number of preparations on the market which are to be sprayed on concrete are claimed to remove this wetting necessity. Freezing during winter construction periods will cause continued difficulty with the floor in later years. This type of floor may be ground to a surface of comparatively high polish. After drying, the floor should be washed with a 10 per cent solution of muriatic acid, then rinsed with clear water and let dry. The floor may then be treated with a liquid hardener or sealer. This will prevent "dusting."

#### Terrazzo Floors

A second type of manufactured stone flooring is the terrazzo floor. While probably the most attractive of the floors of this class, it has several disadvantages. It will split and crack. It can become very slippery. It is susceptible to acids and alkalis, but is easy to clean. Terrazzo floor is a mixture of marble and granite chips with cement. The chips are "floated" to the surface, and when the floor has properly set is ground to a high polish by machine. Strips of brass are inserted in the mixture, laying the floor off into squares or designs which may be varied as to shape or color.

Terrazzo flooring is fireproof and not affected by moisture to any great degree. It has a hard smooth surface and is long wearing. On the other hand, stains are hard to remove; alkali cleaners cause it to dust and bloom. Acids—hydrofluoric, sulphuric, muriatic—will all corrode the floor and pit it. Where it is laid in corridors, care should be taken to have mat-wells constructed at door entrances as it becomes slippery when wet. Outside snow and mud will have to be removed at these mats when the children enter the building. Terrazzo cleans with comparative ease and is attractive. It is seldom used in a classroom because of its "cold" surface. It is not resilient and has a tendency to show cracks due to building settling.

#### Tile Floor Setting Methods

Allowance of two to two and one-half inches should be made in the base floor. A one to three cement and sand mortar is then placed over the base, well dampened, and the tile laid in the desired pattern, where tiles are used. Tiles are first soaked in water for



about fifteen minutes and then allowed to dry for the same time. Where the terrazzo is poured into pre-set molds of brass strips a somewhat different method is used. Allowance of about two inches below finish grade is made for base slab. This is covered with a fine sand cushion, which in turn is covered with tar paper. Mortar base is then placed about one and one-fourth inches thick and about three-quarter inch below the surface of finished floor. Twenty-gauge dividing strips are laid down, soldered or fastened by patented devices, and leveled. When the mortar base is hard enough to roll, the terrazzo is poured to strip level.

After stripping off the top excess, the material is rolled to make it compact, then floated and troweled once. When hardened, this flooring grinds down with a grinding machine to a high polish. The last process is to clean with clear water and fill all pits and holes with a thin grout of cement paste, then regrind.

#### Floors of Magnesite

A third type of manufactured stone flooring is the magnesite floor. This is made up of magnesium oxide, fillers and binders such as cork, marble chips, and sawdust, together with a chemical to "set" the mixture when laid. One advantage of this type of flooring is that it may be troweled over an existing floor. Unfortunately it does not wear well.

One fire-resistant magnesite is made of asbestos and marble chips with sawdust, cork and leather. This type of flooring may be poured on the job or may be made up in tile form. It is sometimes used in bulk and laid over old concrete or wood work floors. It is laid in two coats of about one-quarter inch thickness with each coat allowed to dry for several days. It is somewhat more resilient than concrete or terrazzo flooring and has advantageous acoustical properties. This type of flooring, although somewhat similar to concrete, does not weigh too much—about three to five pounds per square foot. When worn it may be renewed by patching. The disadvantages of this type of flooring are that it will blister and bloom. It must be waxed frequently. It will absorb grease and wax stains readily, and is not acid-resistant. In addition, where patched it will show an obvious patch in the same manner as a patched concrete floor.

#### Installation Techniques

Magnesite flooring can be laid over wood, concrete, brick, steel or iron, provided the sub-floor is solid and dry. One loose board will cause a crack across the entire room. The room should be about 60 degrees when the flooring is laid. Magnesite flooring can be walked upon within a few days after laying if it has been covered with building paper of some sort to protect the surface until hardened. When laying over wood sub-floor, all boards are securely nailed before installing. Sub-floor is covered with a heavy building waterproof paper over which is installed metal lath. When covering concrete sub-floor, all lime and impuri-

ties must be removed to achieve satisfactory results.

Concrete floors directly on the ground must be adequately drained and waterproofed. The smooth finish must be roughened by chipping so that the new material will have some anchorage. Over steel surfaces, the sub-floor must be thoroughly cleaned and unpainted. Anchorage material is provided by the manufacturer. When this type of flooring has become well set it should be scrubbed with a scrubbing machine using little water. When dry, buff up to a polish using first a steel wool pad, then a buffing brush on a rotating floor-polishing machine.

#### Tile

Tile flooring is the last of the manufactured stone type. We find it in various lobbies, often in lavatories (because it resists uric acid), and on walls. Tile flooring is used with satisfaction on stair risers and treads. Most tile floors are alkaline and may powder if not treated. In view of the joints which may be affected by acids or alkalis which do not affect the tiles themselves, the weakness of this type of floor is principally in the joints. Further, these floors are susceptible to rust stains.

Ceramic tile has a variety of uses in the modern school building. It is used with great success in lavatories and in places where a high standard of sanitation is required. There is a great range in colors and designs; it is durable, fire-resistant, and reasonably easy to maintain except for direct repair which requires the services of an expert.

#### Tile Setting

Tile floors are cold and noisy underfoot. Comparatively little can be said here as to tile laying inasmuch as it is the work of specialists. Suffice to say that when laid over a sub-floor, (it cannot be laid without a sub-floor) in case of wood, a heavy tar paper should be laid first to prevent swelling of the wood due to moisture of the mortar. Where laid over concrete this precaution is not necessary. A heavy stiff cement mortar is spread over a small area and leveled with a screed. Tiles are placed and hammered with a block and mallet. After setting about two days, the floor is washed and joints grouted with a thin cement. Excess cement is removed with sawdust or fine shavings. After a few days a white seum often appears which can be removed with a 10 per cent solution of muriatic acid. Rinse with clear water and seal.

#### Composition Flooring

The final group of flooring materials listed as "cloth" includes any number of composition flooring materials. Principally, they are: linoleum, cork, mastic or asphalt, and rubber. This class of flooring has numerous advantages and disadvantages. Their attractiveness, durability under reasonable conditions, ease of maintenance and repair are just about equal to their fire hazard, lack of hardness (they will show marks for having weight in spots for any length of time), and

tendency to crack. It is just about 50-50. In all cases they require a sub-floor.

#### Asphalt Flooring

Asphalt tile flooring, has come into considerable use lately. Until recent years this type of flooring has not been used as much as one would expect, due to the fact that it was soft and had a tendency to wear, crack and show indentations due to weight of objects placed upon its surface. The postwar material is much improved and has a harder surface. In addition, it is moisture-resistant, is laid in a moisture-resistant mastic and is easy to repair as well as attractive in design. Unfortunately, asphalt tile is susceptible to damage from oils, grease, gasoline and similar liquids. Sweeping compounds which have an oil mixture, and which are left in little piles, are hard on this flooring.

#### Better School Flooring

Asphalt tile and asphalt flooring are becoming generally accepted as one of the best types of flooring for school buildings. In recent years manufacturers of asphalt tile flooring have overcome the difficulty of combining wearing quality with coloring.

The darker the tile in color, the lower down in the building it should be placed, or rather, the nearer to moisture danger. This is because it contains the most asphalt. For instance, solid black tile should be placed on basement or first floors while solid white will do best on the upper decks. This flooring can be secured in tiles or rolls and can be laid successfully under moisture conditions—below grade if necessary. It is reasonably warm, resilient, and non-slippery. Cigarette burns will not permanently injure this floor; ink will not stain it; and it is nearly fireproof. It resists acids, alkalis and electricity.

Where laid in tile form, the repairs are comparatively simple in that the tile is heated with a torch, chipped out, mastic made solvent by heat and a new tile inserted. Almost any janitor with reasonable mechanical ability can do a repair job. The disadvantages are that the tile is affected by severe heat or severe cold. For instance, tiles laid directly over a boiler room which is not sufficiently insulated will be susceptible to marking because they will be softened by the heat. Tiles laid near doorways will crack and chip during the winter months as a result of the severe cold coming under the doorways, etc. It is soluble in oils, grease and gasoline. This type of flooring in the paint shop or the industrial arts area will be of little use, as the removal of paint stains will dissolve the tile. The same will be true of kitchens; grease will do a similar damage. Excess moisture will loosen the tile from the sub-floor. It is not as resilient as linoleum or rubber and will not withstand heavy loads such as machines and pianos without showing scars.

#### Easy to Install

Asphalt flooring should be stored in a warm room for about a day before laying. If tiles are warm they will

more readily conform to the surface level of the sub-floor. Waterproof asphalt cement is applied to a small area of the floor and the tiles laid on. A smooth, clean sub-floor is essential. The sub-floor should be tightly nailed, well sanded and without heavy-worn spots. Sometimes it is found expedient to lay a 15-pound asphalt-saturated felt cemented to the wood surface. Do not lay asphalt products over wood floors attached to sleepers set in concrete fill at or below grade. Such floors will dry rot. Removal of excess cement is important and is done with steel wool and alcohol or kerosene. There are any number of patterns, designs and sizes of set tiles or rolls obtainable and a number of manufacturers of this type of flooring.

#### Types of Linoleums

Linoleum is made up principally of oxidized linseed oil, cork, resin, and coloring. As a general rule, battleship linoleum is accepted as best in quality because it is thickest. Inlaid patterns may be secured and many attractive designs are obtainable. We find that linoleum adapts itself well to kindergartens, libraries, offices, etc., where the wear is comparatively light as to traffic lanes and where attractive design is sought.

Linoleum was invented by an Englishman in 1862. However, it was not placed in general use until 40 years later due to his inability to produce it in quantity and in patterns. It is easy to install and may be laid over old floors, either wood or concrete. It is an insulator against heat and cold. It is resilient and quiet. There are a wide range of colors and patterns and linoleum is reasonably easy to maintain. Generally speaking, the heavier grades will give good service for at least five years and many have been in service for as much as twenty years, depending upon wearing conditions. However, it is not recommended for floors in direct contact with the ground. Below-grade wood or concrete floors must be well vented. It will mark if heavy weight is placed upon it for any length of time.

#### Installing Linoleum

Linoleum should be laid after having been in a warm room for about 24 hours and should be installed in a room at about 70 degrees of temperature. Wood floors should be double and have the same general construction requirements as a completed floor with the exception of surface hardness. If the floor has been oiled, it should be thoroughly scrubbed with a lye solution. Remove all wax and grease stains with alkaline solution and gasoline. Be sure the floor is dry before installing.

The linoleum should be cut with the fewest possible seams to fit the area. Expert mechanics can make fittings to exact contours of cupboards, pipes, etc. A layer of felt is adhered to the floor-boards running across the boards and rolled with a 150-pound roller to bind it thoroughly to the sub-floor. The linoleum sheets are then laid with an inch or so of overlap in

the center of the room and so that the joints of the felt and linoleum joints do not come at the same place. When the material has been rolled from the center toward the walls to eliminate bubbles and is thoroughly set, the overlaps are cut through and rolled down to make a fine tight seam. When laying over concrete, the same procedure is used except that the laying of felt is optional depending upon the room, resilient qualities required, acoustical situation, etc. While construction within the building continues the linoleum should be covered with building paper to preserve it from scratching, marking and staining.

#### **Rubber Flooring**

Rubber flooring has been used in the United States for almost 50 years. Originally, the rubber tiles were small and of the interlocking type and were plain in color. Today's product is made of reclaimed rubber if it is the cheaper grade, and of new rubber if it is the better quality. It has a nonporous surface; is long-lived; can be installed over any smooth, dry and hard surface; is fire-, acid-, and alkali-resistant. It is resilient and impervious to dirt and moisture. Colors will not wear off, and it is hard to stain.

However, it is subject to expansion and contraction. It will be injured by oils and greases. Rubber flooring cannot be used over sub-floors which draw dampness or those laid directly on the ground. It will scar from weighty objects and will soften from excessive heat. Laying of tiles of this type floor is somewhat similar to the laying of linoleum tile except that the cement is placed upon the tile instead of the sub-floor. When set for a short while, the tiles are rolled to make them adhere to all the sub-floor surface. Edges where traffic is found will need to be bound with brass binding.

A steel-troweled surface instead of a float finish must be provided where the floor is laid over concrete. In addition, laying over wood must be done with a asphalt-saturated felt between the sub-floor and the rubber tile. Where laying over terrazzo or ceramic tile, the floor must have its glaze removed by sand-papering. After installation it should be allowed to remain a few days before further work is done upon it. When cleaning it should not have warm or hot water applied.

#### **Cork Resilient and Durable**

The last floor material in this group is the cork floor which is made of cork fragments bound together with a mastic binder. It is very resilient and reasonably durable when given care. It is used principally for its acoustical properties in such places as kindergartens and libraries. Unfortunately, it will absorb stains rapidly and easily.

#### **Mats: Rubber, Wood, Hemp**

There are any number of kinds and types of matting consisting of rubber rolls, rubber links, mats cut from used automobile tires and bound together with wire,

precast squares and rolls, wood and composition blocks. They can be furnished in any desired width or length and can be arranged in patterns of various kinds with school name, insignia, directions, etc. One company advertises 42 different patterns and kinds. During the war years it was almost impossible to secure good hemp and substitutes have come into being which have proved to be better in many instances. We seldom see the "cork" type mat in newer construction.

#### **Types of Stair Treads**

Manufacturers of stair treads list any number of types and various claims are made for each. There are those which are possible of installation in existing stairs by routing out the treads and inserting strips. Others are bolted to the existing tread. These may be composed of an abrasive material or of metal. Still others may be troweled over worn spots. All of these materials have their advantages and disadvantages.

Treating existing stairways in most instances is not too satisfactory because it presents a riser hazard either at top or bottom step. In most cases it is more expensive in the end than installation of complete new treads. Sweet's Catalog lists a number of manufacturers of these materials. It is important to mention, however, that the safety factor of worn stairs is an obvious consideration which merits the thought of the administrator. Much will depend upon the amount of traffic on a particular stairway, the heavy objects which will be "moved" or dropped along the way, the age of the children using these stairways, etc. Some constructors are now using ramps instead of stairways, covering the ramps with matting as a safety factor.

#### **School Floor Maintenance**

For many years little attention was paid to school floors. Treatments varied with the custodial staff: One year one type of treatment was given; the following year an entirely different method was used. The floors were oiled year after year until they assumed an almost black color and presented a dangerous fire hazard. Most of the work was "by guess and by gosh." Not until 25 or 30 years ago did commercial competition bring about a series of "processes" for floor maintenance and care. As time has gone on, these processes have been refined until today there are a number of excellent and reputable business firms who will guarantee a good maintenance job, provided they have the services of a reasonably intelligent custodian.

Good school floors are no accident. They are the result of careful, painstaking and intelligent care. No two floors are treated alike due to conditions of moisture, wear, proximity to heat or cold, heavy objects placed therein, and type of activity that is conducted in the area.

#### **Mistakes in Cleaning**

First of all, floors should have a suitable surface. Rough flooring will wear rapidly. Certain chemicals



## Stain Removal Chart

Stain:	Linoleum	Wood	Marble	Cement
Acid	Ammonia, Chloroform	Ammonia	Javelle Water	Acetic Acid
Blood	Acetic Acid Water	Ammonia	Pumice Paste	Muriatic Acid
Chlorine	Soap and Water	Chloride of Lime	Scouring Soap	Lye
Candle Grease	Gas and Alcohol	Alcohol	Fuller's Earth	Benzol
Coffee	Soap and Water	Oxalic Acid	Fuller's Earth	Benzol
Grass	Cold Water	Javelle Water	Javelle Water	Lye
Dye	Tartaric Acid	Hydrogen Peroxide	Carbon Tetrachloride	Muriatic Acid
Fruit	Soap Solution	Javelle Water	Hydrogen Peroxide	Lye
Ink	Tartaric Acid	Oxalic Acid	Potassium Permanganate	Soap
Iodine	Denatured Alcohol	Potassium Iodide	Fuller's Earth	Muriatic Acid
Lacquer	Acetate	Acetate or Lacquer Thinner	Acetate	Lacquer Thinner
Liquors	Lemon Juice	Oxalic Acid	Citric Acid	Ammonia
Paint	Steel Wool and Turps	Oxalic Acid	Turps and Whiting	Acetone
Rust	Steel Wool and Soap	Steel Wool and Water	Oxalic Acid and Whiting Powder	Muriatic Acid
Tar	Gasoline	Coal Oil	Gasoline	Gasoline
Varnish	Ammonia and Turps	Sal Soda	Sal Soda and Quicklime paste	Sal Soda

will clean one type of floor yet be very harmful to another. In haste, many custodians will use excess quantities of tri-sodium phosphate, then fairly rot the floor by failing to rinse thoroughly. Many others will use heavy coats of wax or fillers, building up layer after layer of useless "goo" on the surface. The worth-while janitor will prevent accumulation of dirt. He will keep a record of floor maintenance and from year to year profit thereby. He will know the difference between scrubbing and mopping. Scrubbing is done about twice a year, sometimes once a year and is done with a scrubbing machine. Marble, tile, and terrazzo floors are mopped weekly, depending upon the area. Too much moisture in the scrubbing or mopping process will ruin almost any floor, particularly wood.

Floor cleaning compounds are roughly divided into three groups: abrasives which clean by friction, chemicals which clean by dissolving dirt, grease, etc., and soaps. Abrasives are used only for scrubbing. They should not pass a 300 screen. Tripoli, lava, calcium, soapstone, and volcanic ash are preferred. Acids are sometimes used, but with great care and then only to remove special stains.

The cleaning chemicals most often used are sodium hydroxide, potassium hydroxide, and ammonia. Tri-sodium should be added by "feel" rather than by the standard of a "pinch to a pail" as hardness of water varies by area and by season. In soaps, we should use a vegetable oil soap or a neutral soap.

## Floor Cleaning Methods

When using water in most cases use it warm or hot except on rubber tiles. Apply or mix T.S.P. until slippery. Do not use too much water. Mop up water carefully and always rinse with clear water, drying thoroughly. When using abrasives, use a mild 200 or less screen with a machine.

On old rough floors where covered with oil and grime, apply an abrasive first, then a soap and water solution. On un-oiled floors use soap and very mild abrasive. On treated wood floors use the material

which the floor manufacturer recommends—a mild abrasive and a neutral soap with the water softened by moderate amounts of T.S.P. On concrete floors that are very dirty use the same treatment as dirty wood floors. Avoid use of strong alkalies or acids. Mop terrazzo and floors with neutral soap, then rinse with clear water. Scrubbing of asphalt and linoleum floors does more harm than good. They are generally mopped.

## Mops and Driers

There are a number of good flooring machines on the market and most of them are very satisfactory for general use. Custodians seem to find real use for the "squeegee" type of floor drier and long heavy mops which will hold considerable moisture. A mop is now advertised made of composition rubber with a squeegee effect. Mops of the 32-ounce size are most effective. They should be thoroughly cleaned after using and hung with the handle down, thus providing drying and ventilation for the strands. Some pails are provided with screens at the bottom so that dirt will not be constantly surging throughout the water.

Mop squeezers are of various types, but the push-type is better than the wringer or self-wringer type. Carts with mopping and rinsing water are handy but they are difficult to get up and down stairs. When mopping, the janitor should not stop at the end of a swing but keep up a continuous motion somewhat similar to the mowing of grain.

Rinsing is important particularly when scrubbing the floor. Clean water often. The steel wool and scrubbing brush on the scrubbing machine have become a boon to the custodian. It does away with the necessity of having water on the floor and carrying water back and forth. The omission of water in cleaning is also a help to the floor.

## Be Careful with Wax!

There are a number of good water waxes on the market. The reader is advised to check their specifications carefully. The statement that "this wax

is made of a pure carnauba base" should be taken with a grain of salt. How much of this base and what or which of the five grades is used is more important. Water wax can be purchased from \$1.00 to \$12.90 per gallon. This should indicate that there is a considerable range in quality.

#### Which Type of Floor Where?

The various types of flooring to be used in school buildings are many. In the corridors recessed mats composed of rubber links joined together with metal wire should be used. During the winter months children entering the building could scrape snow off their boots; in the spring the mats would serve as dirt-catchers. At all seasons they would be safety devices. Such mats should be placed at all building entrances.

#### Terrazzo for Corridors

First choice for corridor flooring is terrazzo. It is reasonably simple to install and would be best for cleaning. Second choice would be asphalt tile, if there is no excess sub-floor moisture. An attractive floor design could be created from this material.

Lavatories and teachers' rooms should be tiled if possible; otherwise cement should be used. Administrative offices should be floored in rubber tile, asphalt tile or a heavy rug over concrete.

Storage spaces need nothing more than concrete flooring. Libraries should have linoleum tile or inlaid linoleum.

Classrooms may be floored with asphalt tile or maple. A good wood floor in the music rooms is essential because of its acoustical properties.

#### Many Choices for Auditoriums

The combination auditorium-gymnasium could have several types of floor. It could be of pine blocks laid end-on-end, asphalt tile, or conventional maple. On the stage there should be soft wood flooring so that stage machinery might be easily fastened. The front apron of the stage could be of polished hardwood.

The kindergarten floor should be of rubber tile or asphalt tile. There are no great weights to mar this floor: tables are small and chairs are light. The floor should be exceptionally warm and clean.

#### Mats for Danger Spots

Science rooms are subject to all kinds of stains and spilling. Conventional maple flooring is best, with "danger" spots covered with movable rubber mats.

The health room should be of asphalt or rubber tile because of their high sanitary standards.

Two types of flooring can be used in the shop. Conventional maple with rubber mats for safety near machines, or masonite could be used. End grain wood is not satisfactory for shop use because it becomes slippery and loses its seal from grease spillage.

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# THE WORKING HEIGHTS OF ELEMENTARY SCHOOL CHILDREN

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THE architect, in planning an elementary school, is concerned with the adjustment of heights to variations among children of different grades. Failure to place working surfaces, drinking fountain orifices, chalkboard, tackboard, shelving, and similar equipment at comfortable heights so that the greatest number in each grade may use them, presents serious handicaps to school building utilization. Questions to be considered are:

How tall are children in their various age groups?

Do the heights vary by sections or racial groups?

Are children in the community taller or shorter than children elsewhere in the nation?

Lillie Bowman, Director of the San Francisco Bureau of Research, recently secured the answers by studying 2,560 children of unselected school population now attending that city's schools in grades kindergarten to six. The 2,560 pupils whose heights are tabulated in the following summaries are typical of four distinct areas in San Francisco. The 300 or more pupils at each grade level not only are representative of their own district but with one exception are typical of San Francisco children. Commodore Stockton School, which is almost 100 per cent Chinese, resembles the other three schools at kindergarten level only. Regardless of the fact that the children are somewhat older, they are on the average from one to two and one-half inches shorter than children at the same grade level elsewhere in the city.

STANDING HEIGHTS OF CHILDREN IN  
FOUR SAN FRANCISCO SCHOOLS

	Candlestick	Commodore Stockton	Parkside	Sheridan
Kindergarten				
Lowest	40 inches	39 inches	41 inches	40 inches
Medium	45	45	45	45
Highest	50	48	50	50
Grade 1				
Lowest	42	39	43	43
Medium	49	45	48	47
Highest	53	50	54	53

Grade 2				
Lowest	41	42	44	45
Medium	50	49	51	50
Highest	53	52	56	57
Grade 3				
Lowest	47	45	47	45
Medium	52	51	53	53
Highest	56	56	60	58
Grade 4				
Lowest	48	46	50	49
Medium	55	53	56	55
Highest	59	59	62	60
Grade 5				
Lowest	54	50	51	50
Medium	58	55	58	58
Highest	64	60	66	63
Grade 6				
Lowest	—	50	52	53
Medium	—	57	60	59
Highest	—	63	67	65

Chart of Working Heights

These facts on standing heights of school children must be reduced to working heights to be usable by the architect. The chart of working heights presented here includes grades beyond the elementary. It has been prepared through analysis of situations in the local schools, the study of common planning practices, and by cross reference to the standing heights data as collected by Dr. Bowman. Architects in other communities may wish to obtain standing heights in their schools to ascertain any variations from the chart.

The wide range of heights in each grade presents problems which must be fully thought through. In the first grade, for example, working height adjustments for children ranging from 39 inches to 54 inches in height will be difficult but not altogether impossible for certain installations. The median child is 47 inches tall and his needs should determine most decisions, but differences in heights may be made for equipment in quantity, such as working counters, hook rails, and especially movable equipment.



## SAN FRANCISCO CHART OF WORKING HEIGHTS FOR SCHOOL CHILDREN

BUILDING APPURTENANCES	K'd'g	1-3	4-6	7-9	10-12
Door Knobs	36"	36"	36"	36"	36"
Door, Glass Panels	48"	48"	48"	48"	48"
Drinking Fountain	24"	24"-26"	31"	32"	34"
Electric Receptacles	24", or 6" Above a Counter				
Lavatories	23"	25"-27"	27"	30"	30"
Light Switches	36"	48"	48"	50"	50"
Panic Bar	30"	30"	30"	36"	36"
Sinks	25"	26"-28"	28"-30"	31"	32"
Soap Dispenser	34"	40"	44"	44"	44"
Stair Riser Heights	6"				
Telephone		36"-40"	48"	60"	60"
Toilet Stalls	42"	60"	60"	64"	64"
Towel Dispenser	40"	40"-46"	48"	54"	60"
Urinal	{	3" Off Floor	3" Off Floor	4" Off Floor	4" Off Floor
Wainscot, Community Room		36" High	36" High	36" High	48" High
Wainscot, Corridor		54"		60"	60"
Wainscot, Toilet	42"	60"	60"	64"	64"
Water Closet	12"	12"-14"	16"	16"	16"
Window Ledge	27"	27"	33" +	33" +	42" +
BUILT-IN FIXTURES					
Cabinet, Books and Magazines	42"	48"	60"	72"	72"
Cabinet, Display (Storage Below)	{ Top 24" B 24"	T 58" B 28"	T 60" B 30"	T 70" B 34"	T 84" B 36"
Cabinet, Storage and Supplies	72"				
Chalkboard	{ Top 56" B 20"	T 56"-59" B 20"-23"	T 70"-72" B 28"-30"	T 80" B 34"	T 84" B 36"
Chalk Rail	20"	20"-23"	28"-30"	34"	36"
Counter, General	28"	30"-34"	36"	38"	42"
Counter, Cafeteria		30"		36"	38"
Counter, Cafeteria (Home School)	26"	26"			
Fire Extinguisher (Tank Type)	to be recessed at baseboard height				
Hook, Coat (Toilet Stall)	36"	38"-44"	46"-54"	60"	60"
Lockers, Clothes and Books	44"	46"-52"	54"-62"	36" or 72"	36" or 72"
Mirror (Lower Edge Height)	30"	32"-36"	38"-42"	42"	45"
Hook Rail, Coats and Hats	36"	38"-44"	46"-54"	60"	60"
Shelf, Books (Toilet Room)			48"	48"	48"
Shelf, Books (Toilet Stall)			48"	48"	48"
Shelf, Hat and Lunch Pail	42"	48"	52"		
Rail, Directional	24"	30"	34"	34"	34"
Rail, Stair Hand	30"	30"	30"	30"	32"
Tackboard	{ Top 80" B 20"	T 80" B 24"	T 80" B 24"-30"	T 80" B 34"	T 102" B 36"
EQUIPMENT					
Benches, Cafeteria	14" & 17"				
Chairs	11"-13"	11", 13", 15"	13", 14½", 16"	17" 16", 17¼"	18½" 18"
Desks, Classroom			25", 27", 29"	28", 30"	31"
Desks, Typing				26"	26"
Easels	4'-0", 5'-0", 6'-0" to be adjustable for in-between children				
Height Measuring Device	5'-0"	5'-0"			
Pencil Sharpener	e32"	36"	44"	48"	48"
Screens, Folding	48"	60"	72"	78"	78"
Seats	12"	12"-14"	14"-16"	17"	18"
Stools	6"	12"	18"	24"	27"-30"
Tables, Cafeteria	23" & 28"	23"-28"	23"-28"	28"	31"
Tables, Classroom	19"	19"-22", 25"	25"-27", 29"	28", 30"	31"
Tables, Drawing	24"	26"-30"	30"-32"		
Tables, Work	24"	26"-30"	30"-32"	30"-32"	32"
Tables, Cooking				35"	35"

# RADIANT HEATING

By THOMAS L. SCIORTINO

**W**HAT is radiant heating? What are the advantages? How is it installed? How does radiant heating differ from conventional systems? These are just a few of the questions asked daily about a method of heating which is as old as the sun or man-made fire. One might ask, if radiant heating is this old: Why is it known as the modern method of heating? The answer is: Man has just discovered that radiant heating is essential for his comfort and well-being, and is learning how to apply and control this type of heat to obtain comfort.

## How Does It Work?

The earth is warmed by the radiant heat rays from the sun. All living things grow and develop under the influence of these stimulating rays. Without them the earth would be cold, barren and without life. The radiant heat rays given off by the sun are very much like light rays in that they are absorbed or reflected depending upon the surface of the material with which they come in contact.

The radiant heat rays pass through the earth's outer spaces which are extremely cold before they reach the earth; yet when they meet the solid objects on the earth they warm them. Radiant heat rays, like heat by convection or conduction, move from a warmer to a cooler object and upon coming in contact with a cooler solid surface are either absorbed or reflected. The absorbed rays heat the surface of the solid which they contact, thereby causing it to become a radiant surface and also to re-radiate heat rays.

## Nothing New Under the Sun

The Romans used radiant heating in England 2,000 years ago. Hot gasses from charcoal fires were cir-

culated through ducts to warm walls and floors. Today wrought iron pipe coils are used. An English inventor, A. H. Barker, rediscovered the principle of radiant heating about 40 years ago. Radiant heating has been used in the United States since the early 1900's. In a small school in Indiana, pipes carrying steam were suspended between the floor joists, over which the conventional wood floor was laid.

In 1911 wrought iron heating coils were placed behind steel plates in the walls of certain rooms in the Phipps Psychiatric Clinic in Baltimore. However, little curiosity was aroused over radiant heating until the Johnson Wax Building in Racine, Wisconsin, installed wrought-iron coils in gravel under the concrete floor slab. Following widespread comment on this building, interest in radiant heating has swept the country and a considerable number of installations have been made.

## Travels Three Ways

We can understand radiant heating easily if we review a few facts about heat. One of the first things people noticed about heat was that it seems to flow from a warm object to a cooler object until both are the same temperature. We now know that heat is a form of energy and that it travels in three ways: by conduction, convection, and radiation. Heat travels by radiation just exactly as radio waves or light waves travel in the form of electro-magnetic energy. Not until they strike some object which absorbs them are these rays changed back into heat energy.

To most persons, air temperature is the governing factor as to whether or not they are comfortable. However, it is entirely possible to be in a room having an air temperature of 85 to 90 degrees Fahrenheit and

still feel cold. This is possible where the surrounding wall surface temperatures are considerably below the body surface temperature, thereby causing the body heat to be dissipated quite rapidly. It should be understood, then, that body comfort is not the question of supplying heat to the body, but is instead the matter of how the body heat is lost and at what rate.

#### Body Heat Adjusts to Surroundings

The body does have the ability to adjust itself to varying temperature conditions. If, for example, the air in a room were 85 degrees Fahrenheit, the body heat loss by convection would be considerably less than if the room air were 70 degrees Fahrenheit. However, the surrounding surfaces would necessarily have to be at a lower temperature with an air temperature of 85 degrees Fahrenheit than they would be with an air temperature of 70 degrees Fahrenheit in order to maintain the proper balance of body heat loss. This leads to the fact that if the surrounding surfaces in a structure are heated, the radiant heat loss from the body will be controlled, and it will be possible to set up a comfort condition with an air temperature of as low as 60 degrees Fahrenheit. This comfort at a low temperature is brought about by maintaining the balance in the body heat loss.

Heating coils may be installed in many different ways. For floor installations one way is to lay a false floor over the joists, lay sheets of insulating material over this, then lay the pipe. The finished floor is laid on nailing strips placed between the coils.

In recent years concrete floors have become increasingly popular especially where no basement is contemplated. In this type of construction the usual practice is to build a foundation wall from below the frost line to any desired height above ground. The space within the walls is leveled off, firmly tamped and covered to the depth of 6 inches or more with crushed stone or gravel. Over this is placed a coil or grid of pipe, preferably wrought iron since it must be highly resistant to corrosion. When the grid or coil is in place, concrete is poured over it, and this concrete slab is the heat source for the room.

Hot air, not heat, rises. Thus, if the air is heated in a room it will tend to be warmer at the ceiling than at the floor. On the other hand, radiant rays pass through the air without noticeably affecting its temperature; but when they strike an absorbing surface, such as that of a wood floor, carpet or piece of furniture, the surface is warmed. This explains why a room having a warmed ceiling will have a warm floor as well. The rays from the ceiling are absorbed by the floor and they in turn warm a layer of air immediately above the floor. There is practically no difference between the temperature of the air at the floor and other points in the room when ceiling coils are used.

When radiant heating systems are installed in old buildings, several methods are used. The choice depends on the type of building and the nature and extent of remodeling to be done as well as on heating

needs. Pipes may be laid under the floor between joists, or on top of old floors, in ceilings, or in walls. Sometimes considerable ingenuity is required—but no more than architects usually exercise in modernization.

The designer's question as to where to locate radiant heating coils—that is, floor, wall, or ceiling—is not so intricate as might be imagined. The choice rests on a few simple, practical considerations and floor elements are heavily favored. About 95 per cent of the installations in this country during the past few years have been in the floor. The balance have been in the ceiling, with only a very occasional wall coil being used to supplement either floor or ceiling units.

The reason for the predominating choice of the floor coil is largely economic. As a rule ceiling installations cost 10 to 20 per cent more than the corresponding floor element and this factor is usually decisive. As further theoretical merit, the floor coil offers these advantages:

1. More constant relationship to occupant as he moves about.
2. Closer to occupant and therefore more efficient due to diminishing heating effect as he moves away from source of heat.
3. More efficient transfer of convected heat.
4. Greater effect at lower temperature due to sensitivity of feet and legs to heat and cold.

Four considerations are of primary importance in the selection of pipe for radiant heating coils:

1. Satisfactory piping material must transfer heat with the smallest possible difference in temperature.
2. It must be mechanically strong, and expand at the same rate as surrounding materials.
3. It must resist the corrosive conditions encountered in actual service.
4. The material must be readily bent and welded into a strong durable unit.

Each of these factors warrants careful examination.

#### Expansion of Materials

Wrought-iron and concrete or plaster expand at practically identical rates. It is thus possible to bury wrought-iron coils in solid concrete and maintain a solid bond between the two materials without cracking the masonry or setting up high stresses in the pipe. On the other hand, copper piping materials expand about 30 per cent faster. This means that it is practically impossible to maintain the intimate contact necessary for maximum heat transfer and greatly increases the danger of cracking. Stresses at the joints of copper or brass conductors may also be raised to the breaking point if fittings or couplings are locked in masonry. These considerations have led to widespread use of wrought-iron for radiant heating coils.

#### Little Danger of Corrosion

Corrosion on the interior surface of piping materials in a closed hot water heating system is not generally a matter of great concern. The reason for



this is that, once filled, only relatively small quantities of fresh water are added as time goes on and thus the available amounts to corrosive elements are strictly limited. Also radiant heating systems are usually operated at temperatures sufficiently low to prevent the release of semi-bound gases which would prove actively corrosive.

Even though these various corrosive factors may not result in perforation of the pipe wall, the use of a corrosion resistant material such as wrought-iron prevents reduction of flow by tuberculation. Naturally, if the coils become seriously plugged with corrosion products formed by action of the water on the pipe material, flow is reduced to a marked degree and heat transfer is retarded, lowering the capacity of the system. The hundreds of reported cases where hot water lines of corrosion resistant wrought-iron pipe have been in service for decades without a serious reduction in flow capacity amply illustrate the uniformly satisfactory service which can be expected from wrought iron radiant heating installations.

Past experience has proved that it is most unwise to assume that radiant heating coils are beyond the reach of corrosive attack on the exterior pipe surface simply because they are located in the normally dry portions of the structure. As a matter of fact, a corroding effect may easily result from (a) the presence of moisture which is condensed from the atmosphere on the relatively cold metal surface when the system is not in use; (b) the presence of active chemicals and moisture from the air or from plaster or concrete in contact with the pipe; (c) ground water seepage in installations laid in gravel fill on the ground; or (d) water entering the structure proper through leaks or as a result of vapor-borne moisture.

#### Advantages of Wrought-Iron

Moisture which condenses on the cold exterior surface of radiant heating coils when the system is not in use dissolves carbon dioxide from the air and thus gradually becomes acidic. Wrought-iron is recognized by leading authorities in the radiant heating field since it has been used for many years for very similar services such as brine coils in ice skating rinks which are usually cast into concrete slabs.

In most modern installations, coils have been bent from wrought-iron pipe and the joints welded. Wrought-iron pipe can be readily bent, and the bending work involved in radiant heating is an exceedingly simple technique which can be rapidly and smoothly handled by craftsmen familiar with it. As long as a few basic principles are followed, no concern over distortion or restriction need be felt. The work may be done either by hand or machine, depending on the facilities available.

After a system has been fabricated and installed, common practice is to subject it to a severe test so as to be sure there are no leaks before concrete, plaster, or flooring is applied. There are several methods of testing but the basic system most generally used in-

volves placing the entire piping arrangement under a hydraulic pressure of 125 to 200 pounds per square inch for several hours.

Such procedure will normally disclose any poor welds or pipe which might have been damaged or overstressed during fabrication. The expense involved is small—certainly much less than would be the case if repairs were necessary after the installation was completed and the rest of the structure finished.

#### Steam and Hot Water

Both steam and hot water have been satisfactorily used. Steam in some cases will give a faster acting installation due to the higher temperatures used. However, the disadvantages accruing to steam generally make hot water the first choice. Among these disadvantages are: (a) greater danger from corrosion; (b) more delicate installation technique required since all pipes must be carefully pitched; (c) ease and accuracy of control of hot water; (d) poor efficiency since steam pipes must be placed farther from heating surface to prevent local overheating and uneven expansion.

Based on information developed from an appreciable number of radiant heating installations beneath wood floors, no out-of-the-ordinary results need be expected. The low temperatures and relatively slight air movement encountered apparently do not set up a drying action any more severe than is normally the case with conventional heating systems. It should be remembered that the temperatures encountered in radiant systems are not much above those of a midsummer day.

Green wood could certainly be expected to be just as troublesome when used with a radiant heating system as it would with any other system.

#### The Effect of Heat on Concrete

A number of buildings with wrought-iron heating coils embedded in or under concrete floors are proving eminently satisfactory. For example, a church in Pittsburgh has the coils completely surrounded by concrete, and after sixteen seasons no cracking of the concrete or trouble of any kind has resulted.

Even in a building with a conventional heating system, cracking of plaster is a common problem and when the plaster is heated, particular care should be taken to assure satisfaction. Designers usually prefer metal lath for radiant heating work. Selection of a good grade of plaster, uniform heating, curing in accordance with the manufacturers' recommendations, and adequate mechanical support for the lath all seem to be steps in the right direction.

So far as is now known, none of the commonly used floor covering materials will suffer from the use of floor coils. Hundreds of installations involving rugs, linoleum, asphalt, tile, hard wood, rubber tile, and various monolithic surfaces, have been closely observed for several years and no deleterious effects have yet been discovered. The reason for this condition is that the floor surface temperatures in a properly controlled

installation will not go above 85 degrees Fahrenheit, which seems to be within the temperature ranges that all of these substances can be expected to withstand.

Where mastics are used, such as in fastening asphalt tile or wood to concrete, it does seem reasonable to inject a note of caution to the effect that minimum amounts of mastic be used. If too much is applied, it would be more likely that some would work out of the joints and conceivably cause some annoyance.

Linoleum, asphalt tile, and kindred products have also proved quite practical even though earlier opinion was that the temperatures involved would harm them. Actually the absence of any severe drying action seems to permit the materials to give normal service life.

#### Effect on Paint

Engineers of one of the large paint manufacturers in Pittsburgh have commented on the possible effect on paint of warming wood, plaster or metal surfaces, and in their opinion no difficulty need be anticipated due to deterioration of the paint or change in the composition of the pigments if the operating temperature remains below 230 degrees Fahrenheit. The warmed surface in radiant heating installations are usually maintained at temperatures far below that.

Floors and household furnishings are not affected by floor coils since they do not exceed the temperature of an average summer day.

Ceiling coils have relatively little tendency to heat furnishings to an undesirable degree since they are somewhat removed from them.

When wall panels are used it may be necessary to keep furnishings a sufficient distance away from the panels to allow for air circulation.

#### Air Never "Cooked"

Unless conditions of use or occupancy are severe, it will be found that radiant heating will provide a sensation of freshness to room air. The reason for this is that the "stiffness" and "cooked air" common to conventional systems are absent since room air never comes in contact with any high-temperature surfaces.

In buildings such as schools, churches, and theaters where there are a great many occupants for long periods of time, it is frequently considered advisable to increase the quantity of incoming fresh air. There are a number of ways of accomplishing this, depending on the structural characteristics of the building and the magnitude of the heating job caused by the fresh cold air.

In many cases, the ventilating load will require only a relatively small air flow which can be nicely handled without any possibility of discomfort.

#### Drainage Must Be Planned Ahead

The problem of drainage is one which requires a little study in advance of construction. The question to be determined immediately is whether it is very likely that complete drainage of the system will ever

be required. Normally, the only predictable reason for complete drainage is to prevent freezing and damage due to a shut-down in cold weather. However, the practice of leaving some heat on in buildings during periods of non-use in winter is becoming more and more common, particularly in residences. The development of dependable, low-cost automatic controls has made it quite practical to reduce room temperatures to 50-55 degrees Fahrenheit and allow the heating system to run at this level.

When preliminary studies show that means for drainage are desirable, several steps can be taken. The most positive is to pitch all pipes one-fourth inch in every 10 feet toward a common low point where a tap or drain can be installed. Such construction permits rapid and complete emptying of the system and definitely eliminates any danger of freezing.

#### Antifreeze Added to Water

Various permanent-type antifreeze liquids can be injected into the water with good results. Although this method of protection against freezing has been followed on only a few occasions it does seem to present a solution where extreme consideration is given to the freezing problem. Normally, this is not the case and it seems unlikely that such practice merits general adoption.

When a radiant heating system is started up in a completely unheated building (such as a building completed during cold weather) a considerable period of time will elapse before comfortable conditions are produced. This is due to the fact that structures with radiant heating store large quantities of heat in structural members during normal operations and some time must elapse before, in a manner of speaking, these "reservoirs" are filled. Actually, this lag is little less than that encountered under similar conditions where conventional systems are employed, even though with the latter the sensation that the heating system is operating can be felt very quickly. Although the radiators are warm or the registers are delivering hot air, the room surfaces are still abnormally cold for a long period of time before air-borne heat can warm them to the point where the high radiant loss from the body is reduced to a point of comfort.

As a matter of fact, there is increasing evidence today that a properly controlled radiant system is perhaps the most responsive of all.

#### Repairs Not Difficult

Piping failures in a radiant heating system can be repaired just as plumbing or heating system failures are handled at the present time. While it is possible to cut away concrete or plaster and repair piping failures, it is highly desirable to use a durable piping material.

Some of the advantages of radiant heating are:

1. The radiators are out of sight and do not occupy floor space which can be used for other purposes.

2. Radiant systems, particularly the floor type, are usually installed and the heating men gone from the job before the building has progressed very far. Work of other types then goes ahead without conflict of any kind with those installing the heating system. In cold weather, another advantage exists in the fact that other workers are able to work in warm surroundings.

3. The heating system does not affect the location of partition walls or later changes of such walls.

4. The floors are warmer than in buildings heated by more ordinary systems and cold air currents along the floors are less intense.

5. The initial cost of the system depends largely on labor costs and will not vary much from that of the ordinary systems.

6. The cost of operating the system is somewhat lower than that of the ordinary system for the following reasons: (a) for equal comfort, the temperature of the air within the building is slightly lower and hence the cost of heating the air which passes through the building is lower; (b) the heat loss through outside walls is somewhat lower, especially when the windows have double glazing; (c) when either water or air is used as the heating medium, lower temperatures are used than in ordinary heating systems and therefore

an economy in fuel combustion usually can be effected.

7. Dust and dirt problems are reduced with radiant heating. The wall above a radiator is generally dark; especially is it noticeable just at the top of the radiator where light and dark vertical patterns show the paths taken by air currents. The section of wall actually behind the radiator is really clean, since it is heated by radiant energy to a temperature above that of the passing air. Convective and diffusive forces tend to deposit dirt on the wall but there the temperature gradients are large enough to repel all dirt and the wall remains clean. The warm air rising to the ceiling establishes a high temperature gradient there and the result is that the ceiling becomes dark. In radiant heating with the even distribution of heat, there are no excessively dirty spots in the room.

#### A Look into the Future

We of today do not know the forms of the shelters of the future. However, there will no doubt be a need for artificial heat during the colder seasons. Since so many of our present-day homes, public office buildings, churches, garages, schools, and hospitals are now satisfied users and enjoyers of radiant heating, the future will see a widespread and limitless use of this type of satisfactory heating system.



# SCHOOL SOUND SYSTEMS

By WILLIAM A. VEIT, Jr.

**I**N OUR modern culture, listening to radio programs has become a paramount step in the learning process for daily living. Consequently, educators have come to realize the importance of developing a generation of intelligent and objective listeners. The schools can do much to develop good listening habits both in school and in the homes. Children of school age listen to the radio nearly as many hours each day as they spend in school. Education cannot ignore this challenge and trend in popular habit, nor should it fail to take advantage of the motivating medium that radio presents.

The U. S. Office of Education anticipated this need and, accordingly, influenced the recent action of the Federal Communications Commission to allocate a wave band which would allow twenty FM radio stations for educational programs exclusively. Educational systems of large cities have taken advantage of this effective teaching aid and, consequently, are providing suitable broadcast facilities. New York City has recently inaugurated this service through its FM Station WNYE. This station will broadcast educational programs for children of all school ages, all week, throughout the entire school day. The 10-kilowatt transmitting power of WNYE provides an appreciable range, and should make the programs available to surrounding outlying communities.

## **The Sound System as a Tool For Learning**

The extent of a school sound system installation should be determined in terms of the educational needs of the school. Like all educational investments, optimum return is realized through the fullest pupil participation. This participation depends on the age level of the pupils and consequently varies for ele-

mentary schools, junior high schools, and senior high schools.

Pupil participation among younger children in elementary schools will be more or less limited to the reception of broadcasts and playback of transcriptions and recordings. In high schools, however, the diversity of interests and activities makes pupil participation limitless. In fact, it is easy to conceive of groups of varying interests working separately at times, and together at other times, utilizing the sound equipment practically the entire school day.

Sound recording and reproduction play an important part in the educational program. Historical speeches and proclamations can be recorded and rebroadcast over the school system for special situations and events. Moreover, the reproduction of recorded student work allows the analysis for further study to stimulate vigorous creative work in speech, English, and radio broadcasting technique.

Student participation programs, properly controlled, afford a splendid means of self-expression. For the more talented student, the romance and glamour of radio should also create a stimulus for further training in various fields; and moreover, may enable some students to take their first steps toward a career. Indeed, the sound system presents an excellent means for this opportunity through student plays, skits, forums and discussions, musical and vocal programs, and student organization activities. Furthermore, it provides an enlarged audience extending beyond the confines of the classroom.

Among more matured students in high schools, the sound system, located in a suitable control room, can provide a practical laboratory for the training of radio technicians. Such sound equipment under the

proper supervision provides equipment as essential in these new fields as machinery is in vocational training. A curriculum of this nature would develop talent and experience required for station engineers, managers, program directors, producers, announcers, script writers and numerous other specialists.

From an administrative point of view, a central sound system is useful for making announcements to the entire school or parts of the school. It is also useful as a paging device to locate people in the building. However, this feature can be very disturbing and objectionable and, therefore, should be used judiciously.

#### **A Central Sound System Has Many Potentialities**

The following are some of the many possible uses of a school sound system. By no means do they represent the total list of potentialities:

##### *Educational*

1. Reception of daily radio educational programs.
2. Dissemination of news of important historical events as they occur.
3. Rebroadcasts of special programs.
4. Distribution of transcriptions and special recordings.
5. Recording studio for all students.
6. Subject class production of radio adaptations made by students from class texts.
7. Subject class production of student written scripts.
8. Training in microphone technique.
9. Training in special classes in radio, drama, music, forums, etc., for either intramural or actual local radio broadcasts.
10. Sound effects for dramatic stage productions.
11. Radio laboratory for a curriculum to develop talent and experience required for station engineers, managers, program directors, producers, announcers, script writers and numerous other specialists.
12. Intelligent and objective listening habits.

##### *Administrative*

1. Disseminate routine, emergency measures, extracurricular activities, and as a guide and calming device in the event of fires.
2. Provide program signal.
3. Supplement the intercommunicating telephone system.

##### *Sound Amplification*

1. Provide local sound systems in the large spaces such as gymnasium, auditorium and cafeteria for independent use or in conjunction with the central sound system for pupil or community activities.

#### **Considerations in Planning**

In providing sound equipment, it is important to install equipment which will serve most adequately

the needs of both immediate and long range. To do this a program of radio education should be formulated and a realizable goal should be established. It is important that the selection of equipment for the central sound system will satisfy the needs to meet this goal. Too often, complexity of a system shies teachers from its use and, consequently limits its utilization and functional value.

The basic requirement of a sound system is to provide communication from a central control to all rooms of instruction including the gymnasium and auditorium. In high schools this provision should include all outlying offices, cafeteria, teachers' rooms and student activity rooms, if the system is to make possible communicating with any and all parts of the school for administrative purposes.

The *control room* which houses the central control panel is the heart of the sound system. The central control panel should be equipped with a combination FM and AM radio receiver, provision for connecting a turntable or microphone, a selector switch to connect one of these inputs to the broadcast, switching equipment for each loud speaker, and a monitor loud speaker to monitor each program.

Greater flexibility and utilization are provided if loud speaker switches allow each speaker to be connected to either of two programs. These program connections are usually called "channels." Such channeling allows two programs to be carried on simultaneously and sent to selected rooms. This selection is essential where radio broadcasts and phonograph or in-school production programs are to be distributed simultaneously. The monitor speaker can be provided with proper switching to permit monitoring of either channel. In high schools two radio tuners should be considered. This arrangement will permit listening to two radio programs simultaneously, either FM or AM.

The location of the central control panel is very important and, in some instances, may even limit the uses of the sound system. Its location should allow proper control and supervision without interference with its normal use by conflict with other activities. This suggests a central location preferably near the office suite with suitable sound and traffic isolation to avoid any conflicts. If necessary, a glass vision panel can be suitably located to provide adequate supervision from the general office.

In large high schools where radio production is a major part of the educational program more extensive sound facilities are required. Such facilities incorporated in a *broadcast studio*, will include several remote pick-up connections which require special equipment known as "mixers" to blend the entire production into one program. These facilities may nearly approach a miniature broadcast station and should be housed in a separate sound-insulated studio. The control room should adjoin this studio and be separated by a plate glass vision panel. This permits greater flexibility in distributing radio and recorded

programs to some rooms while a studio program is in progress.

Special consideration and treatment is required in the studio and control room. The following is a list of such items:

1. Sound isolation to provide a quiet area.
2. Sound insulation and conditioning to eliminate audible interference and provide acoustical effects.
3. Isolation of electrical equipment which might effect the quality of the broadcast.
4. Storage facilities for equipment and recordings.
5. Clock.
6. Microphone connections.
7. Warning and signal lights at entrance doors.

The *administrative office* can be equipped with a microphone and a loudspeaker. A simple switch manipulation can be provided so that the use of the microphone or loudspeaker can be connected to either channel directly at the administrator's desk. Adjustment of the loudspeaker can be made if a "non-shut-off" volume control is provided.

In order to insure dissemination of important administrative warnings and bulletins, all loud speakers should be controlled from the central control panel only. Local shut-off switches are not desirable. Where local sound adjustment is provided, a "non-shut-off" type of adjusting device should be installed.

The location and number of loudspeakers in classrooms and larger rooms of instruction become individual considerations. Loudspeakers should be provided and located to afford the maximum in listening ease. In general, one loudspeaker in front of the classroom will suffice. In larger rooms and irregularly shaped rooms two or more loudspeakers may be necessary.

The acoustical conditioning of these rooms is often a great factor in listening ease. A well balanced acoustical condition increases the effectiveness of the sound system and economizes on the number of loudspeakers.

#### **Auditorium, Cafeteria and Gymnasium Facilities**

Most large spaces such as auditoriums, cafeterias and gymnasiums require a public address system for sound reinforcement. Where such systems are connected to the amplifier on the central control panel, a separate "non-shut-off" type volume control is required to adjust the respective loudspeaker. In most instances, separate local systems with individual power amplifiers will prove more economical and practical than amplification from the central control panel. Space for additional amplifiers on the control panel and the need for local loudspeaker sound adjustment are determining factors. Moreover, a local system allows independent use and avoids interference with the central system. On the other hand, provision for interconnecting the sound system from these larger spaces is recommended, both so that programs distributed on the central control panel will be available

in them, and so that programs originated there can be distributed over the central system.

Provisions may be made so that loudspeakers of these local amplifier systems can be connected to the central sound system at the control panel, regardless of the local program in progress.

#### **Program System Throughout Large Schools**

In large schools a program system requiring an automatic program clock and bells in all educational spaces involves a considerable expenditure. Very often the sound system can perform this additional function at an additional cost, yet at a cost much less than that of a separate program system. This can be accomplished by connecting the central sound control panel with an automatic program device that will start the amplifiers at a predetermined time.

A signal generator can then be made to transmit a signal over all loudspeakers, regardless of the programs in progress. However, using the sound system instead of bells should be carefully considered. It provides one more complication of the control panel and therefore should be installed only when it contributes to the administration and affords a saving.

#### **Necessary Equipment for Sound System**

The extent of a complete sound system will depend on the need and the funds available. However, limited funds should not cause the installation of an inferior system. It would be wiser to provide the essentials and forego some of the less essentials until more funds are available. Careful consideration of the function and performance duty of each unit of equipment will afford considerable economy. For instance, the frequency range of equipment units primarily reproducing voice may be considerably less than such units to reproduce a high quality of orchestral music. The frequency range of equipment is an important factor in cost. In general, the performance of a sound system depends on the power output, frequency range, distortion and room acoustics as well as the proper locations of loudspeakers and microphones. However, the overall performance of the integrated system will depend on the degree to which the electrical characteristics of the component parts match in the various operating combinations. Therefore, because of the many technical aspects which must be considered in the installation of a sound system, it is highly desirable to rely on a competent sound engineer for advice and guidance.

The following is a brief description of sound equipment that has performed satisfactorily under school operating conditions:

**Classroom Loudspeakers.** Speaker units 7 or 8 inches in diameter, of the cone type, employing "Alnico 5" metal for a permanent dynamic field. Power rating five watts with a frequency response of 70 to 8000 cycles.

The housing may be made of metal or wood 15 inches high and 11 inches wide with sloping front 7



inches deep at top and 4 inches at the bottom, mounted about 9 feet above the floor.

**Auditorium Loudspeakers.** (Auditorium capacity approximately 500) Speakers of the horn or horn of the cellular type provide adequate distribution and directional features to preserve the illusion of direction from the stage. Speaker should employ a permanent magnetic field of "Alnico 5" with a frequency response of 50 to 10,000 cycles, and a nominal rating of ten watts complex wave. Two speakers are usually required to produce the desired sound coverage and to allow proper location with respect to stage microphones in order to avoid "feed-back."

**Gymnasium Loudspeakers.** Loudspeakers of the horn type equipped with a non-vibrating baffle to provide a distribution angle of not less than 60 degrees horizontally and 40 degrees vertically, adjusted so that the sound is not reflected from the walls. If acoustical treatment is omitted from the ceiling, reflection of sound between the floor and ceiling must also be avoided. Speaker mechanism should employ a permanent magnet of "Alnico 5" with a frequency range of 400 to 7000 cycles at a nominal rating of ten watts and capable of operating at a peak capacity of 15 watts at 1000 c.p.s. to overcome the noise level during violent sport events.

**Transformers.** Suitable matching transformers should be provided at all loudspeakers to permit correct impedance, matching of voice coil and system line impedance.

**General Purpose Microphones.** Microphones for the principal's office, music room, sound control room and auditorium should be of the dynamic type with varying pick-up characteristics so that it may be used with directional or non-directional characteristics. For high quality or sound reproduction, it should have a frequency response from 60 to 10,000 cycles and an output level of not less than -57 db.

**Gymnasium Microphone.** Announce type microphone should be of the dynamic, close talking type with directional characteristics. The directional characteristics will provide a higher ratio of direct to unwanted sound pick-up. The frequency response should be from 100 to 8000 cycles, with not less than -63 db. output level.

**General.** Microphones should be of the low impedance type with rugged design capable of withstanding normal hard usage. Each microphone should be provided with an adjustable stand. Some stands should be the desk type and others of the floor type.

**Radio Tuners and Amplifiers.** Where possible, electronic units should be standard "package units." This permits easy replacement or substitution of units without complete redesign or replacement of complete equipment.

Radio tuners should be suitable for the reception of Frequency Modulated (FM) and Amplitude Modulated (AM) radio signals. For AM radio reception it should be provided with two bands, standard broadcast "A" band from 550 to 1600 kilocycles, and a short

wave "C" band from 9.2 to 16 megacycles. The FM band should provide reception from 88 to 108 megacycles.

Amplifiers should provide a frequency range equal to that of the loudspeakers and microphones used in the integrated system. Where auditorium speakers are used with a frequency range of 50 to 10,000 cycles, the amplifier should also respond to this range. Expert consideration is required in determining the electrical characteristics such as the number of stages, power output, load impedance, sound level and distortion qualities. Upon the proper determination of these characteristics depends the overall performance and quality of the reproduced sound.

**Recording and Playback Equipment.** For many years the most popular recording and playback equipment utilized the engraved disc. More recent developments, however, have brought other methods into prominence involving magnetic wire, magnetic tape, embossed tape and discs, photographic film and others which lend themselves to educational purposes.

The equipment can be classified in three general classes: mechanical, magnetic and photographic. Mechanical recorders and playback equipment utilize a varying groove embossed in a suitable medium. The magnetic equipment records the sound on a movable magnetic medium such as wire or paper or plastic tape coated with a magnetic film. The sound pattern consists of a succession of magnetic fields throughout the length of wire or tape. In the photographic method the sound is recorded photographically on a film. This method is employed chiefly in sound motion pictures.

Recording and playback equipment is available in many varieties. Some are designed to perform one function only; others perform several functions. Thus, some machines will play back recordings only, others will also record sound programs. Machines are also available that provide facilities for a microphone connection to broadcast voice simultaneously with the recording program. Magnetic machines allow erasing of part of the recording or the entire recording.

In purchasing this type of equipment, such features as performance, versatility, portability, simplicity of operation, fool-proof design, electrical characteristics and integrity of the manufacturer should be carefully considered.

#### Magnetic Methods

	MECHANICAL	MAGNETIC
Use	Universal and well established.	Development very active. Offers great possibilities.
Operation	Requires experience.	Simple for inexperienced person.
Portability	Bulky and cumbersome.	Lightweight and very portable. Machine can be operated in motion under wide range of climatic conditions.

	MECHANICAL	MAGNETIC
Fidelity	Becomes progressively poor with prolonged use.	Wear is negligible.
Duplication	Relatively simple.	Expensive at present.
Frequency response	Wide range possible.	Excellent in voice range. Development is increasing the range.
Availability of recordings	Established position makes huge library available.	Relatively new. No library available. Most recordings must be made.
Editing recordings	Requires discarding of disc and starting anew.	Parts of recording may be erased and corrected.
Locating part of recording	Relatively easy.	More difficult.
Storage of recordings	Precaution against warpage, heat, high humidity and careless handling.	Requires little space. Not subject to climatic condition and careless handling.
Repairs to recordings	Impossible.	Tape or wire can be spliced.

#### Television Offers Great Possibilities

Visual aids have proved to be a great asset in the educational field. There is no doubt that television will soon be included among these visual aids. The development of television has made great strides since the end of the war. Programs of special interest are being broadcast regularly. However, the reception of these programs is limited by distance between station and receiver. The industry is spending great sums of money to provide special cables between large cities that will eventually develop a complete network throughout the country. Furthermore, laboratory research has already produced color television.

Black and white television reception is now available in two forms—direct viewing and projected viewing. The projector type provides a larger screen and image than does the direct viewing type within reasonable cost, and, therefore, is more applicable for the large groups experienced in schools. A portable television set equipped with an optical projector system has recently been exhibited. This set projects the image on an ordinary 7 feet by 9 feet projector type screen from a distance of approximately 15 feet.

Educators should not ignore the possibilities which television offers. It affords the combined features of radio and movie projector. However, until the problems of distance, color, and cost are solved, provision for television in schools should be made with caution to avoid early obsolescence of such equipment.

Those responsible for the construction of new school buildings cannot afford to omit some future provision for television. An empty conduit system will allow future installation and is relatively inexpensive if installed in the initial construction. At this time it seems practical to make future provision from a future antenna location on the roof to one classroom on each floor, to the auditorium, and to the central control panel. By installing a suitable junction in the vertical conduit on each floor, future lateral extensions can be made economically at a future time. This provision should serve adequately whether portable television sets or a central television system is later installed. Future television outlets should always be located in close proximity to a lighting convenience outlet.

Television receiving sets consist of two major parts, an FM radio receiver, and the video electronic equipment and image tube. In most instances, the school already has FM radio reception facilities and, consequently, the standard television set duplicates equipment. Industry is already considering this problem and is attempting to design television receivers to utilize the existing radio and loudspeaker equipment. This method will not only avoid costly duplication, but should reduce sizes and weights to provide video equipment that is more versatile and portable. If this method is perfected, it is not difficult to conceive of television reception available in almost every classroom as radio reception is today.

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# WHO SELECTS PRODUCTS USED BY SCHOOLS?

By ROBERT L. HOPPER

Director of Research, American School Publishing Corporation

WHAT BASIC changes have taken place in the selection of materials and equipment for school plants? Is there a trend away from selection by local school boards and superintendents, toward selection by persons who use the materials and equipment? If yes, how far has this trend progressed?

To obtain for its readers answers to these questions, THE AMERICAN SCHOOL AND UNIVERSITY made a study of ways in which schools select the materials they use. School superintendents in every state cooperated in the study. The results show that changes are occurring in school practices and procedures.

## Questions on Selection of Products

This study sought to answer two important questions in the selection process. First, who recommends a given product for use in the system? "Recommends" is defined as the act of choosing a given product for a specific use and proposing that the school system use it.

Second, who has the responsibility of reviewing and taking official action on recommendations? "Review" is defined as the act of considering the recommendations made, approving them, or causing further consideration to be given before final approval.

## School Systems Studied

A sampling was made of school systems in cities of four population groups. The groups were:

	Number of Cities Sampled	Percent of Total Number in United States
Cities over 100,000	86	100%
Cities 25,000 to 100,000	102	32%
Cities 5,000 to 25,000	437	27%
Cities under 5,000	200	5%
Total	825	13%

The school systems participating in this study represented 45 per cent of the total group sampled. From the nature of the sample and the definite trends established throughout the study, there is justification to conclude that replies from additional systems would not show any appreciable change in results.

The objective of the study was to discover who in a school system selects various types of school products. Eight groups were found to play significant parts in the selection process. These groups were defined as follows:

1. *School Board Members*, the elected or appointed representatives of a community, who are legally responsible for the administration of the educational program of the community.

2. *Superintendent of Schools*, the executive officer of the school board, and his assistants, such as assistant superintendents of schools.

3. *Business Manager*, the business agent and his assistants who are charged with the responsibility of purchasing, accounting, and property management under the supervision of the superintendent of schools.

4. *Principal*, the educational official who is responsible for an individual school building.

5. *Supervisor*, an official of the school system who assists teachers in conducting the general educational program, or an official who is responsible for a particular phase of the educational program, such as music, art, or lunch program.

6. *Teachers*, the members of the educational staff who work in classrooms with children and adults for the development of knowledge, understanding, and competencies.

7. *Custodian*, the person employed by the school board to maintain school buildings and grounds.

8. *Architect*, the person employed regularly or for specific periods to design buildings and supervise their construction.

## Classification of School Products

The products purchased for schools were grouped in five categories with subdivisions as follows:

1. *Instructional Supplies*: teaching materials and textbooks; library books and materials; pupils' supplies; physical education supplies.

2. *Maintenance Supplies*: custodial; maintenance.

3. *Instructional and Cafeteria Equipment*: furniture and classroom equipment; laboratory and shop equipment; cafeteria and homemaking equipment; physical education equipment; audio-visual equipment.



## 4. School Buses

5. New Buildings: heating and ventilating equipment; lighting equipment; structural equipment; other building products.

Similar purchasing methods were found to be used within each of the five categories. The charts provide a detailed analysis of the participation of each group of school personnel.

**Analysis of Findings**

Two general facts were revealed. First, school systems in all parts of the United States follow the same pattern in the selection of school products. Second, all school systems regardless of size tend to follow similar patterns. Variations are found only in relatively large school systems where there are greater numbers of specialized personnel. This is particularly true in the case of business managers of large systems who take part in the recommendation of maintenance supplies and school buses.

Because of the similarity in all parts of the country regardless of size of school systems, the process for selecting products may be considered on a nationwide basis. Three series of charts are presented for detailed comparison of the responsibilities of school personnel in the selection of various types of products.

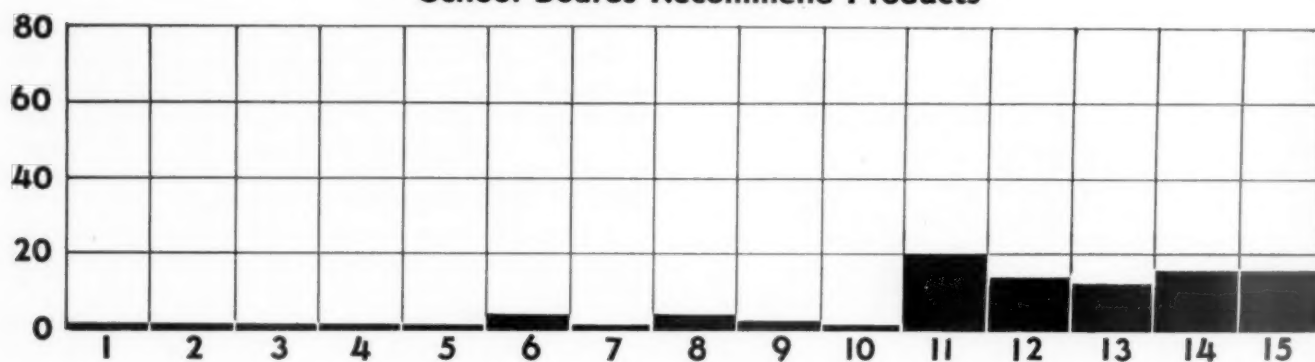
The data in the first series are arranged by types of school products. The charts indicate the percentage of school systems in which the personnel of each classification participate in the recommendation of materials or in the review of recommendation. Since more than one classification of personnel usually shares in making the recommendation or review, the percentages cannot be added to make 100.

The second series of charts shows the percentage of personnel by classification who share in the selection process of each type of product.

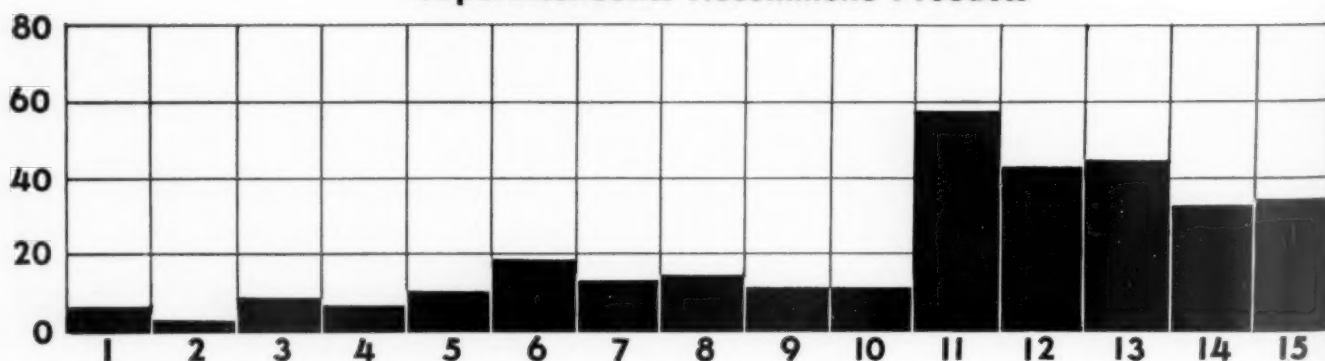
The third series presents summaries of the first and second series. Products have been combined into general classifications. The percentage of school sys-

**First Series of Charts Showing Personnel Who Recommend  
and/or Review 15 Different Products**

**Percentage of School Systems In Which  
School Boards Recommend Products**



**Percentage of School Systems In Which  
Superintendents Recommend Products**

**Key to classifications:**

1. Teaching materials and textbooks
2. Library books and materials
3. Pupils' supplies
4. Physical education supplies
5. Custodial and maintenance supplies

6. Furniture and classroom equipment
7. Laboratory and shop equipment
8. Cafeteria and homemaking equipment
9. Physical education equipment
10. Audio-visual equipment

11. School buses
12. Heating and ventilating equipment
13. Lighting equipment
14. Structural materials
15. Other building products

tems in which each classification of school personnel shares in the recommendation of school products, and the review of recommendations, are shown.

#### Summary of the Facts

Selection of products for school use is a cooperative process. Those who use a specific type of product seem to have a part in determining its use.

Classroom teachers participate more than any other group in recommending supplies and equipment of all kinds. Custodial and maintenance supplies are most frequently recommended by custodians and business managers; school buses by superintendents and business managers.

Building products and equipment are most frequently recommended by architects. However, superintendents, business managers, school boards, and occasionally other personnel participate in recommending these materials.

Recommendations for all types of school supplies, equipment, and products are reviewed most frequently

by the superintendent. School boards seem to participate in the reviewing process of school buses and products for new buildings to a considerable extent. Business managers share in the review of maintenance supplies.

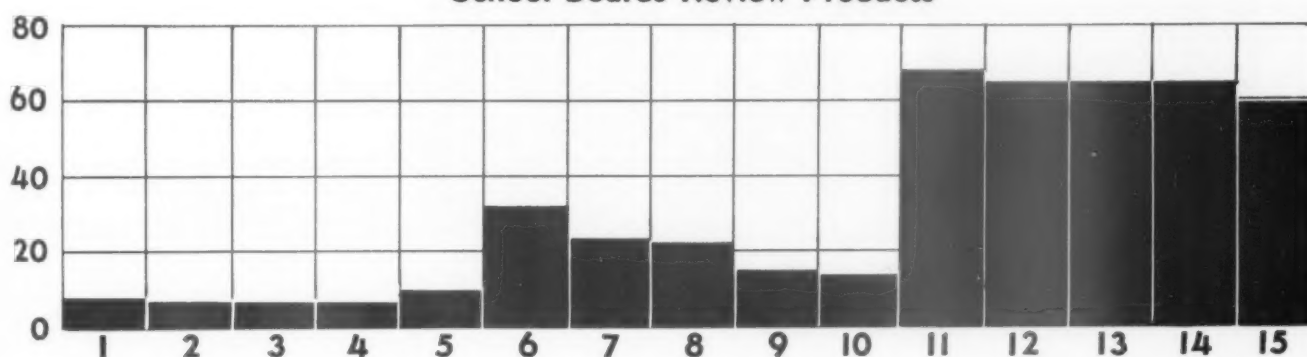
All classifications of school personnel engage to some degree in the selection of products used by schools. There is a distinct trend toward the participation of more than one official or group in the selection of all products used by schools.

Comments attached to replies emphasized that selection of school products is a cooperative enterprise in which several classifications of officials participate.

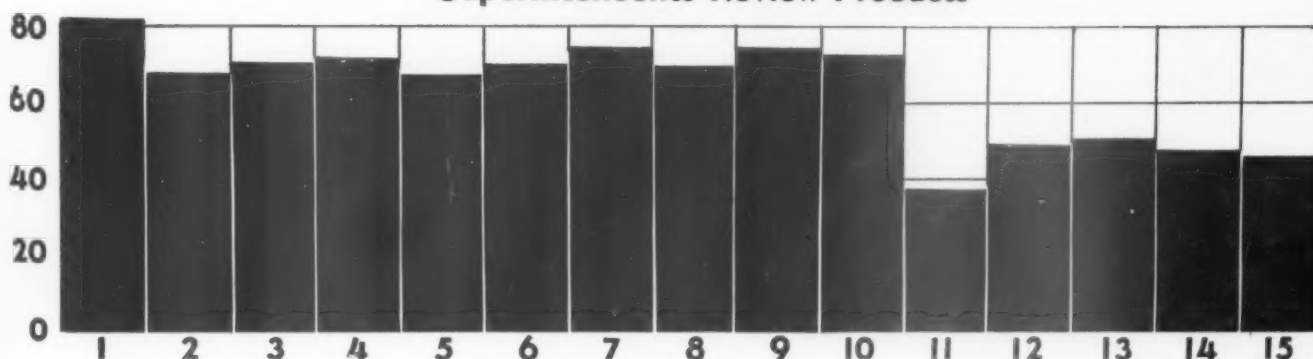
Character of the product to be purchased and the use to be made of it by the school seem to decide who select it.

It is reasonable to expect that cooperative selection of school materials will be used to a greater extent by school systems in the future. Efficient economical management of schools requires democratic participation in the solution of problems.

Percentage of School Systems In Which  
School Boards Review Products



Percentage of School Systems In Which  
Superintendents Review Products



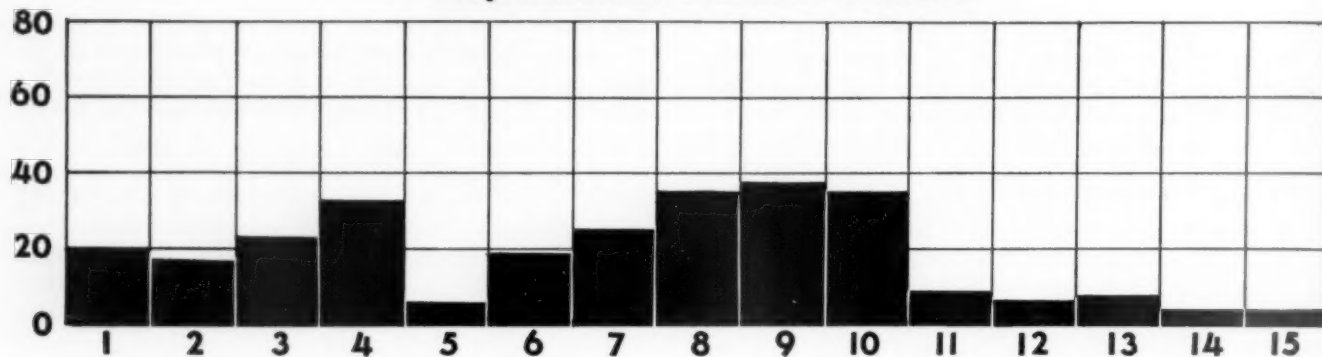
Key to classifications:

1. Teaching materials and textbooks
2. Library books and material
3. Pupils' supplies
4. Physical education supplies
5. Custodial and maintenance supplies

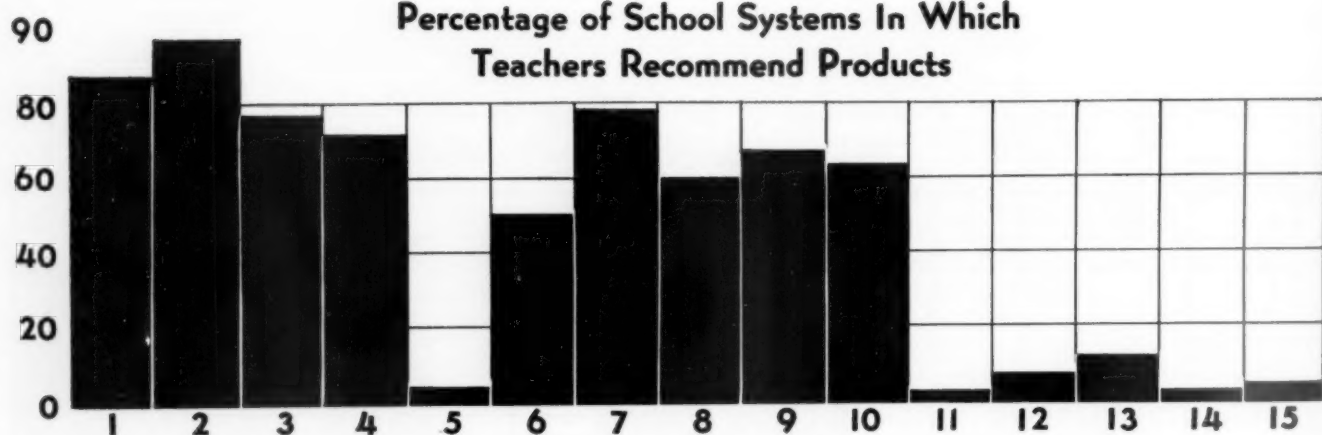
6. Furniture and classroom equipment
7. Laboratory and shop equipment
8. Cafeteria and homemaking equipment
9. Physical education equipment
10. Audio-visual equipment

11. School buses
12. Heating and ventilating equipment
13. Lighting equipment
14. Structural materials
15. Other building products

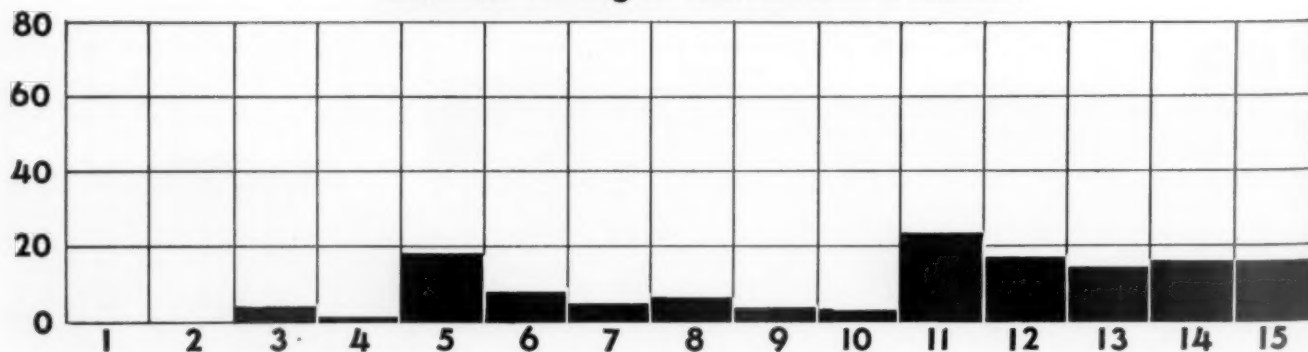
### Percentage of School Systems In Which Supervisors Recommend Products



### Percentage of School Systems In Which Teachers Recommend Products



### Percentage of School Systems In Which Business Managers Recommend Products



Key to classifications:

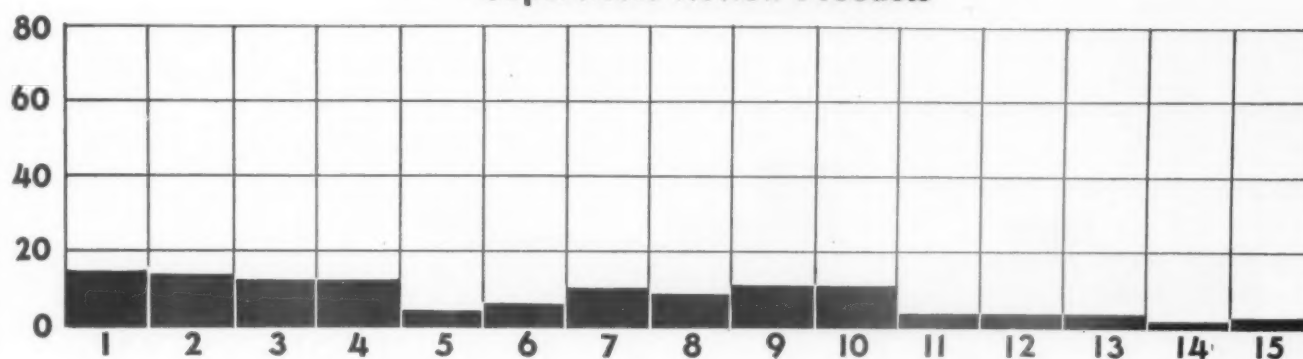
1. Teaching materials and textbooks
2. Library books and materials
3. Pupils' supplies
4. Physical education supplies
5. Custodial and maintenance supplies

6. Furniture and classroom equipment
7. Laboratory and shop equipment
8. Cafeteria and homemaking equipment
9. Physical education equipment
10. Audio-visual equipment

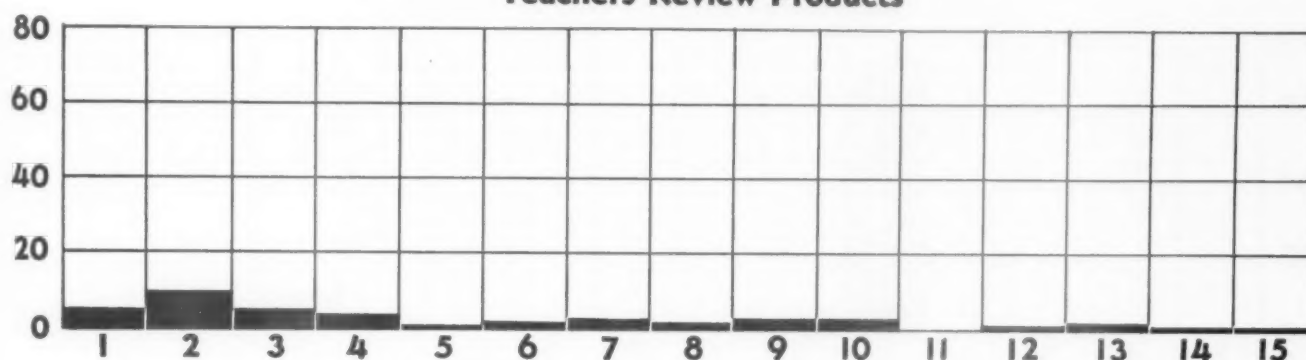
11. School buses
12. Heating and ventilating equipment
13. Lighting equipment
14. Structural materials
15. Other building products



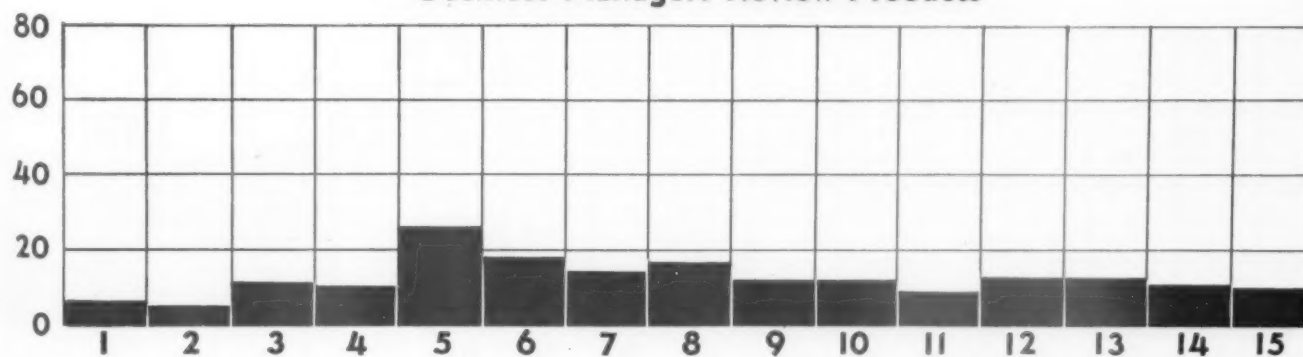
Percentage of School Systems In Which  
Supervisors Review Products



Percentage of School Systems In Which  
Teachers Review Products



Percentage of School Systems In Which  
Business Managers Review Products



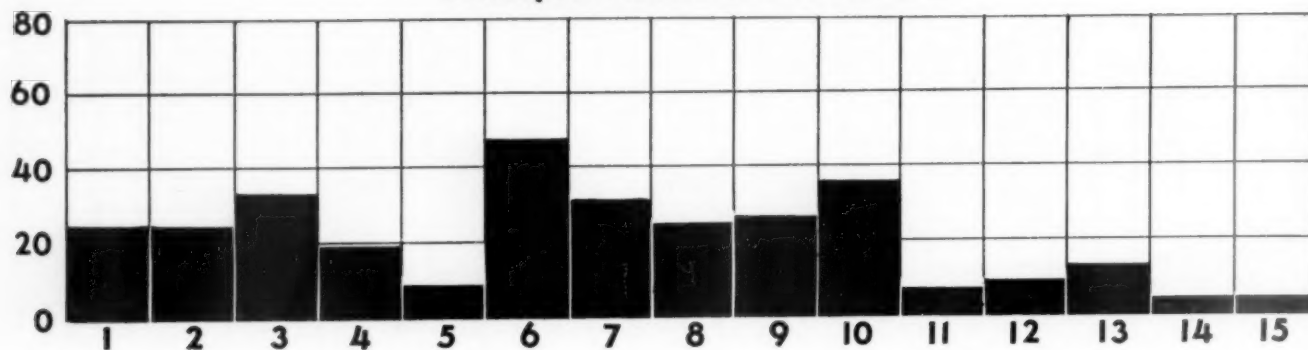
Key to classifications:

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4. Physical education supplies
5. Custodial and maintenance supplies

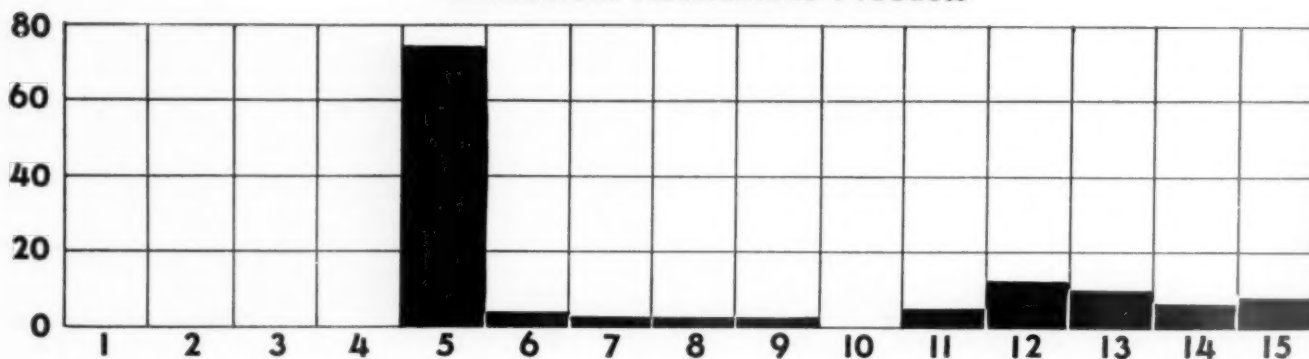
6. Furniture and classroom equipment
7. Laboratory and shop equipment
8. Cafeteria and homemaking equipment
9. Physical education equipment
10. Audio-visual equipment

11. School buses
12. Heating and ventilating equipment
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15. Other building products

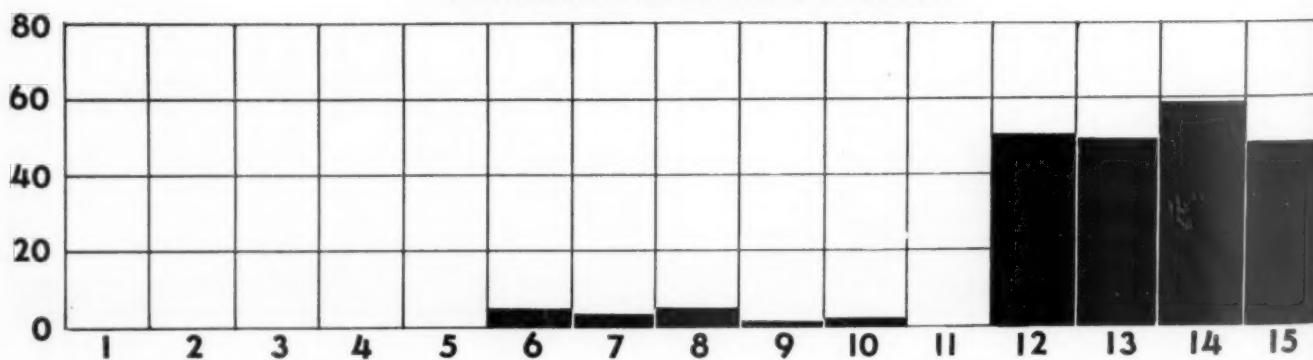
**Percentage of School Systems In Which  
Principals Recommend Products**



**Percentage of School Systems In Which  
Custodians Recommend Products**



**Percentage of School Systems In Which  
Architects Recommend Products**



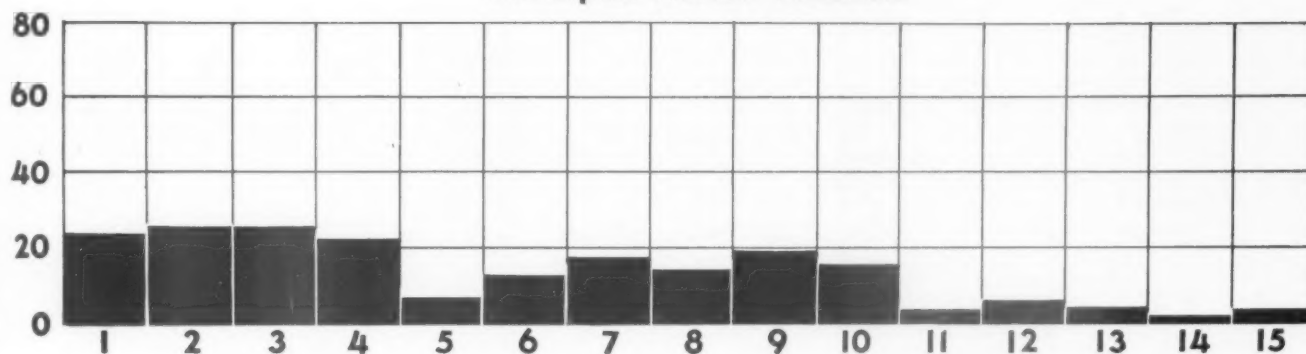
**Key to classifications:**

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3. Pupils' supplies
4. Physical education supplies
5. Custodial and maintenance supplies

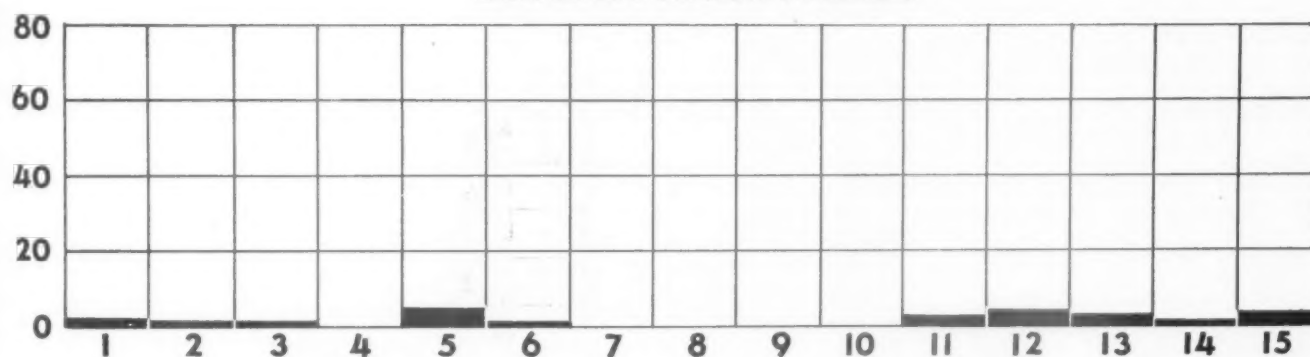
6. Furniture and classroom equipment
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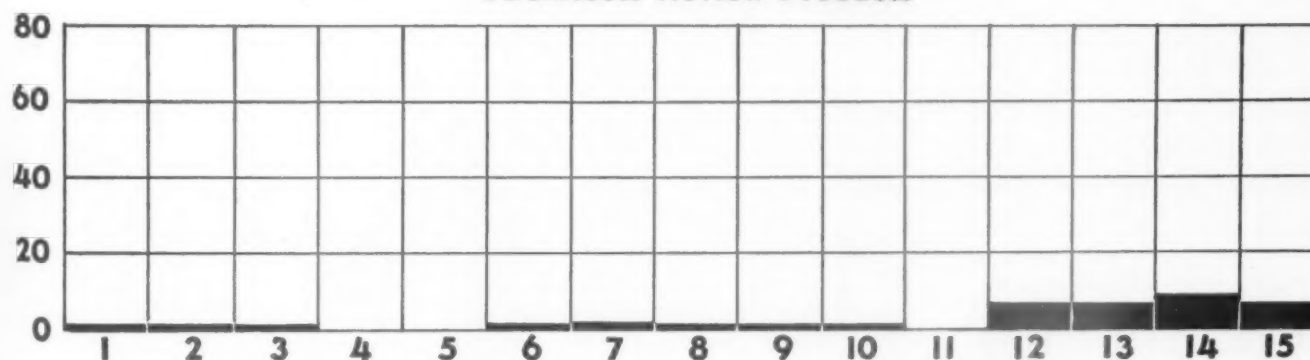
Percentage of School Systems In Which  
Principals Review Products



Percentage of School Systems In Which  
Custodians Review Products



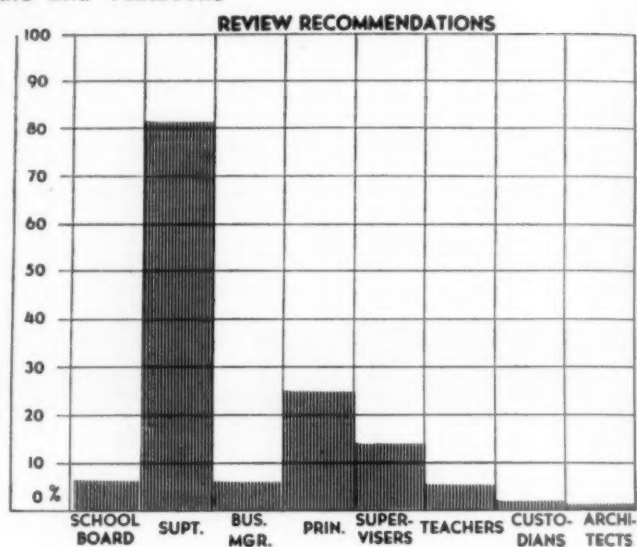
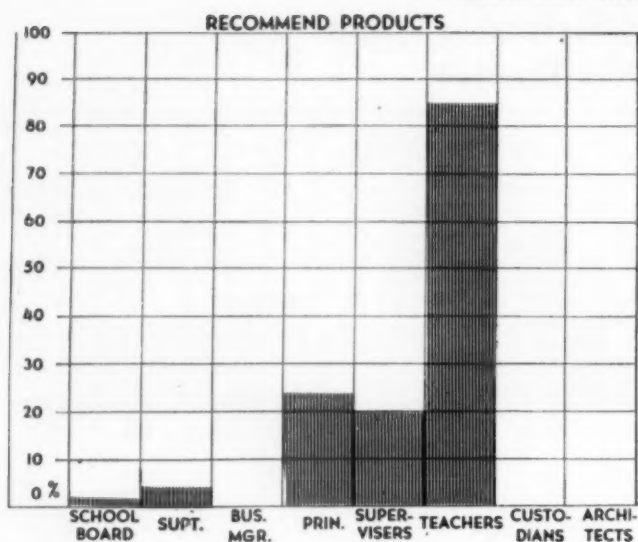
Percentage of School Systems In Which  
Architects Review Products



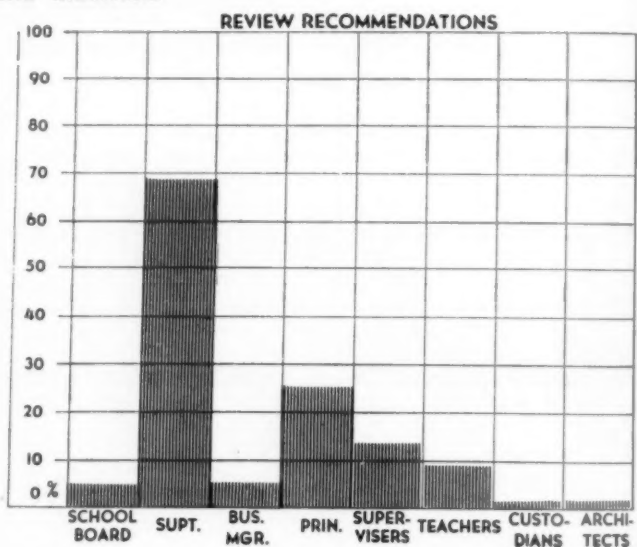
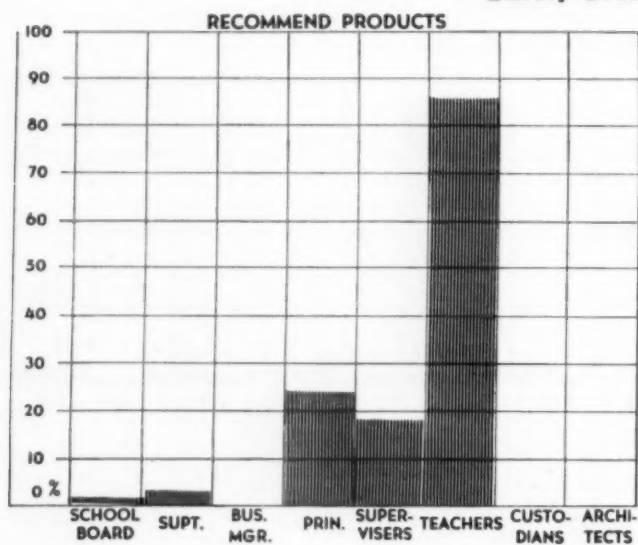
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Percentage of Personnel Who Share in Selecting Products.



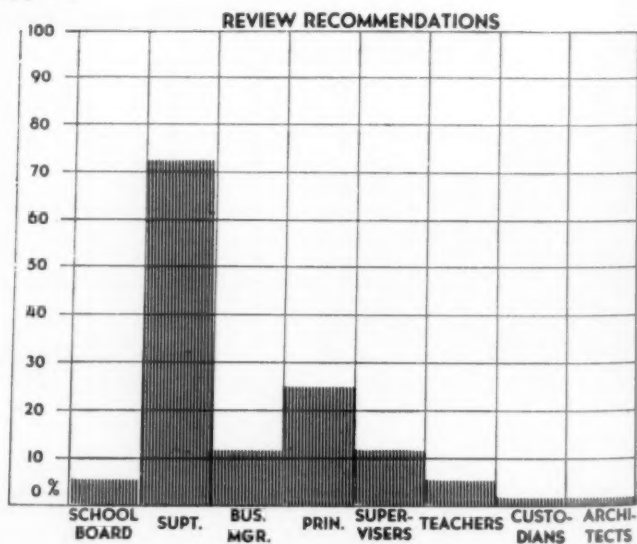
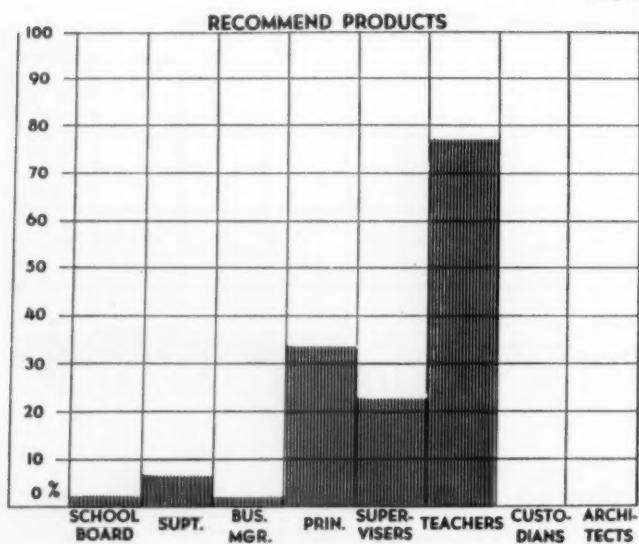
## Instructional Materials and Textbooks



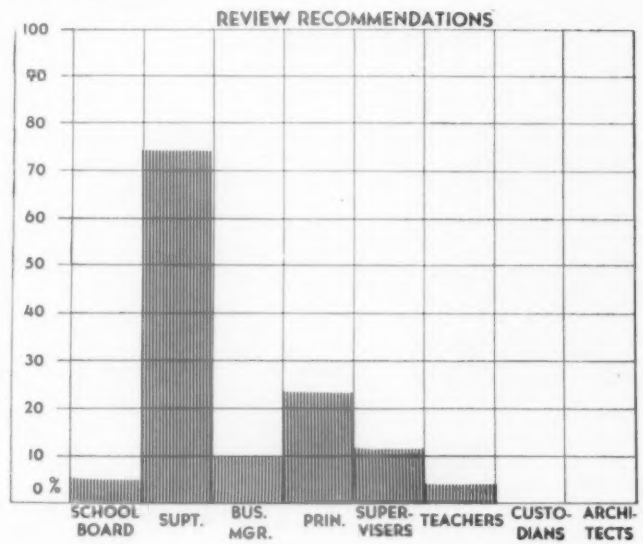
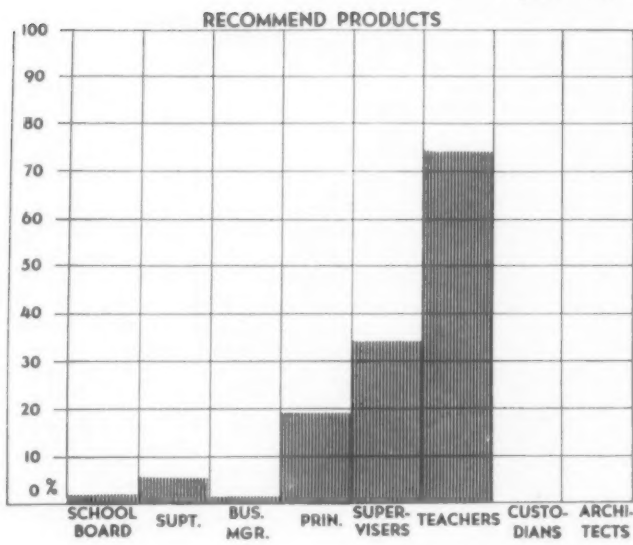
## Library Books and Materials



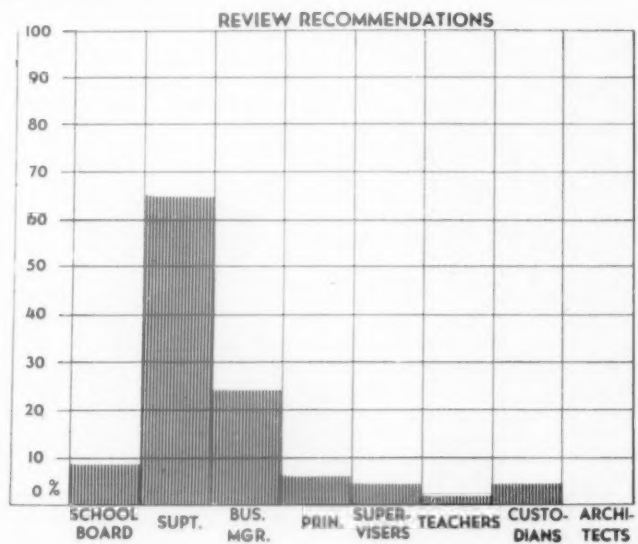
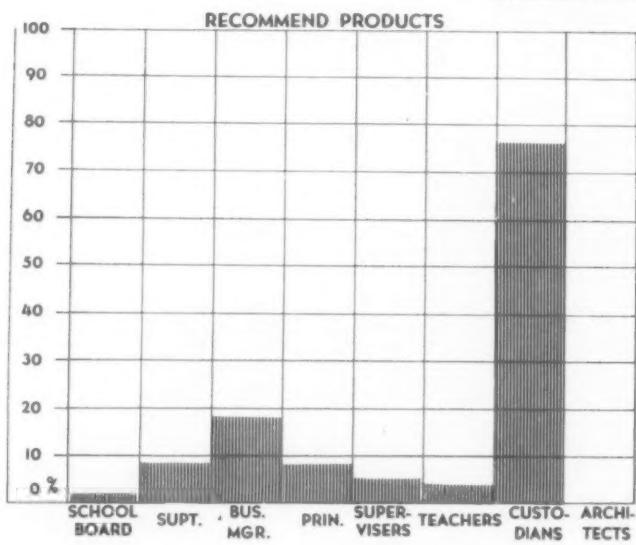
## Pupil Supplies



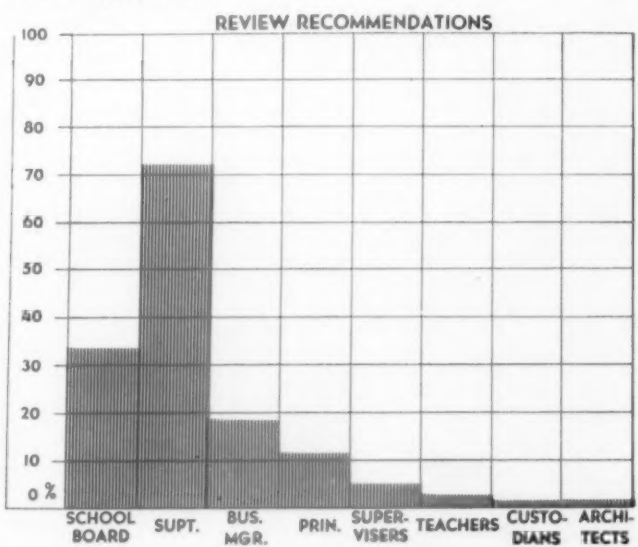
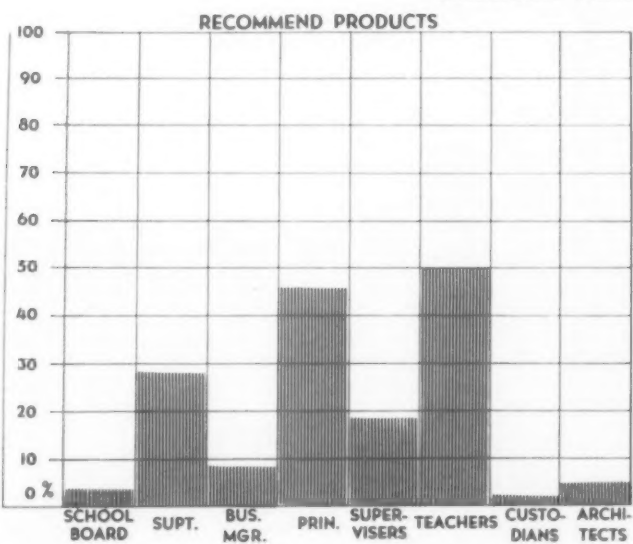
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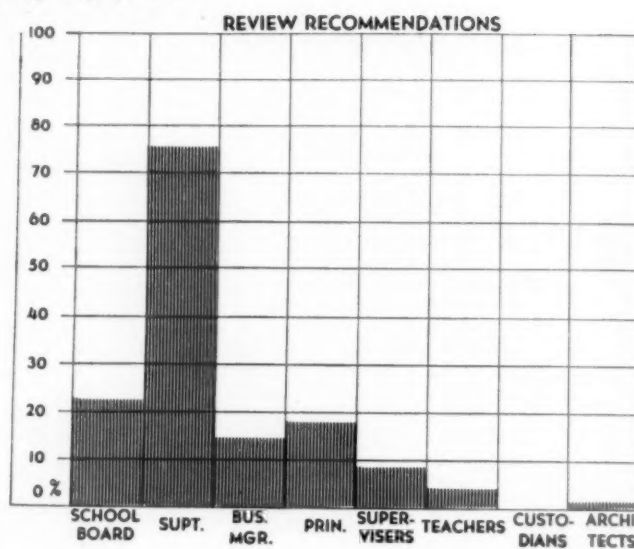
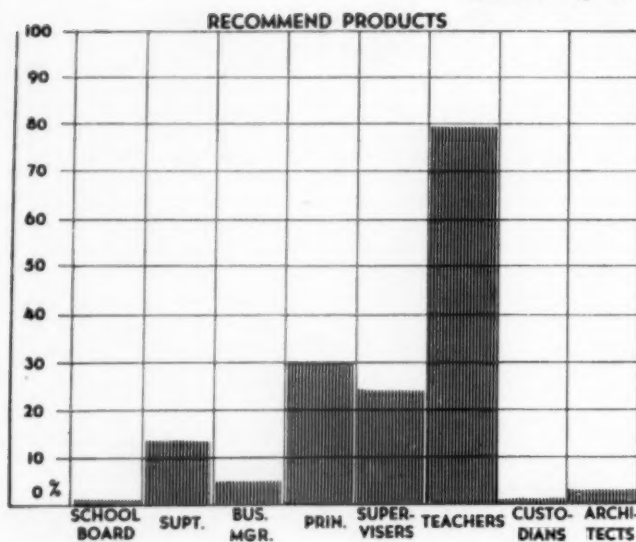
## Custodial and Maintenance



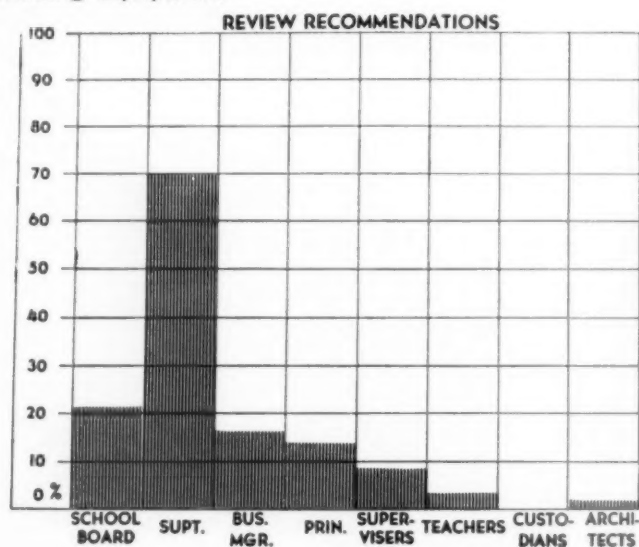
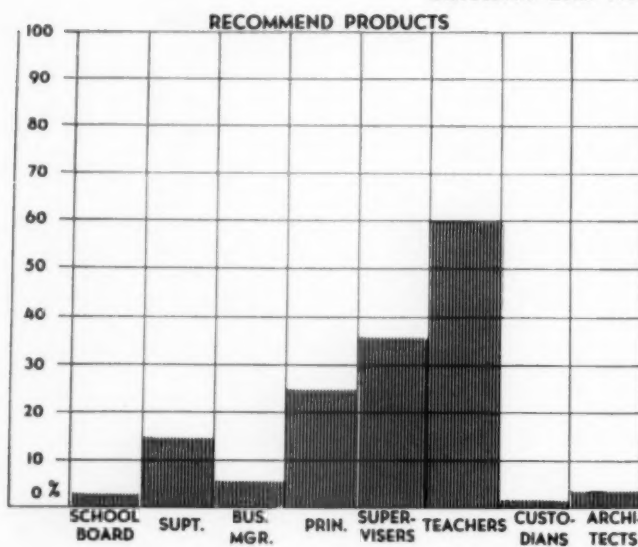
## Classroom Furniture and Equipment



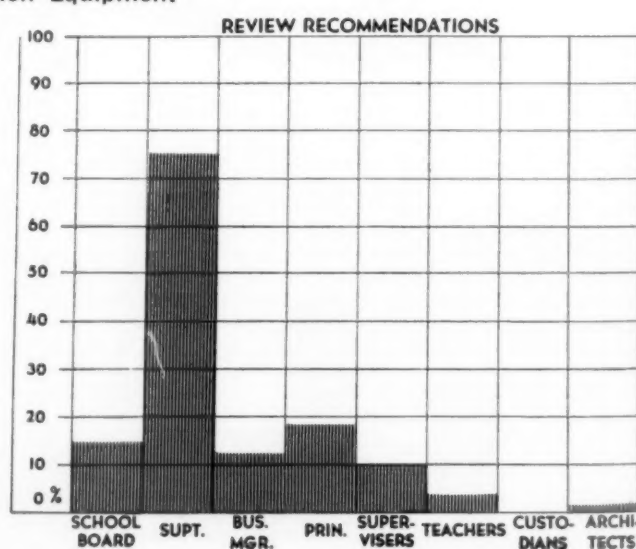
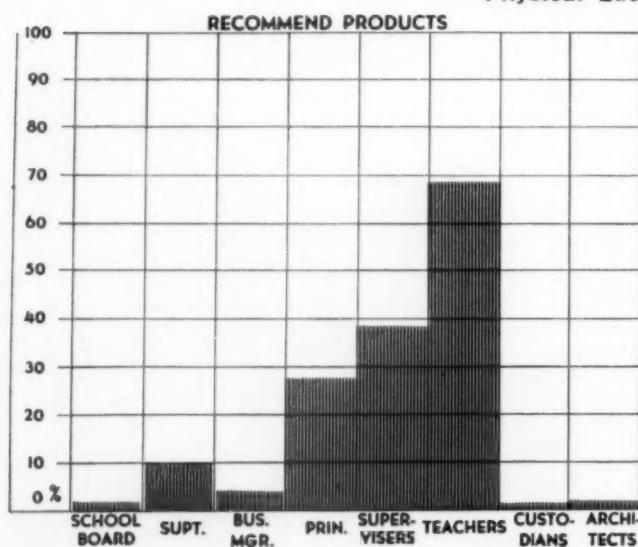
## Laboratory and Shop Equipment



## Cafeteria and Homemaking Equipment

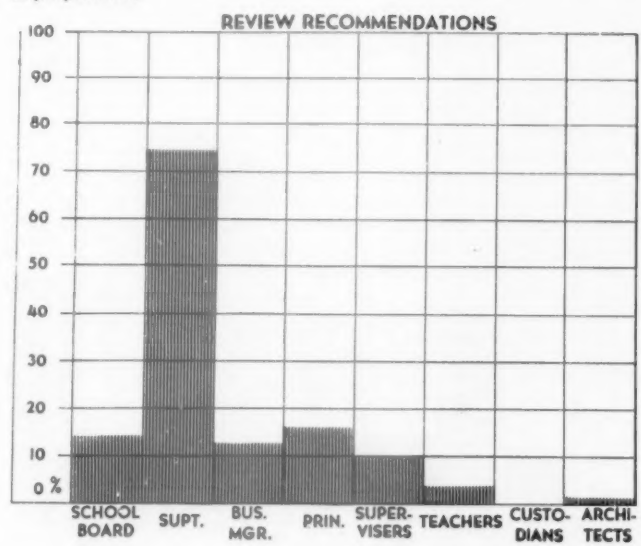
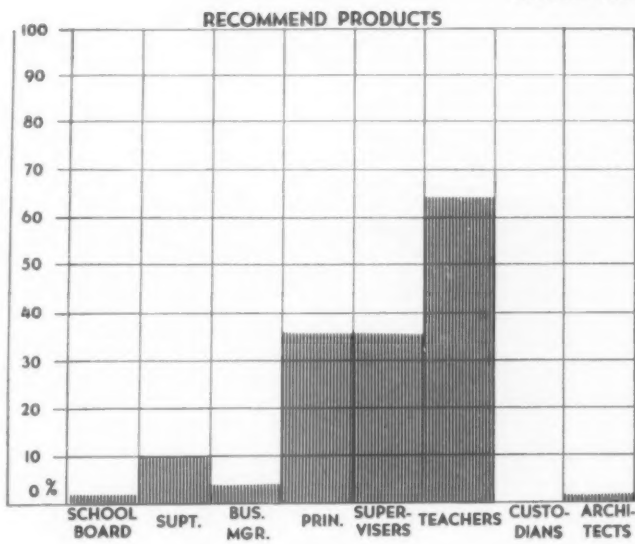


## Physical Education Equipment

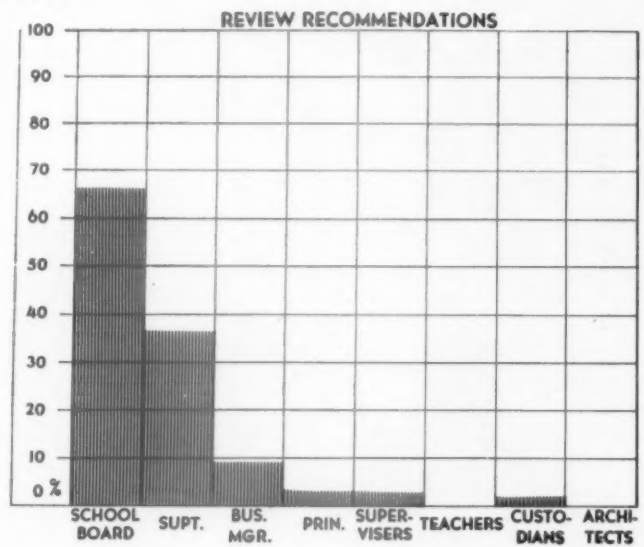
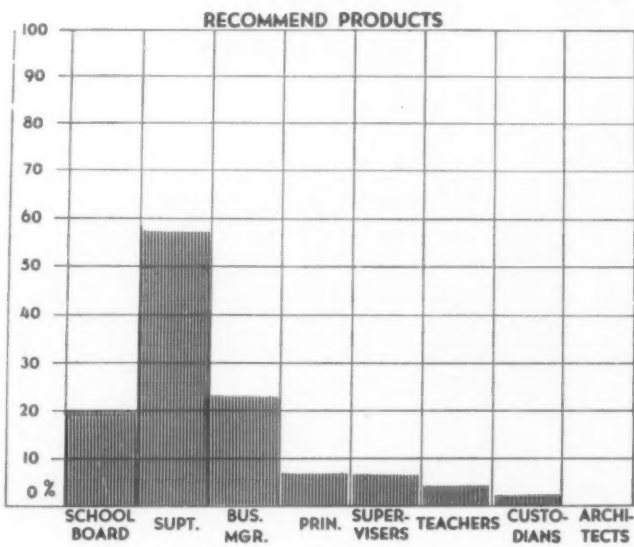




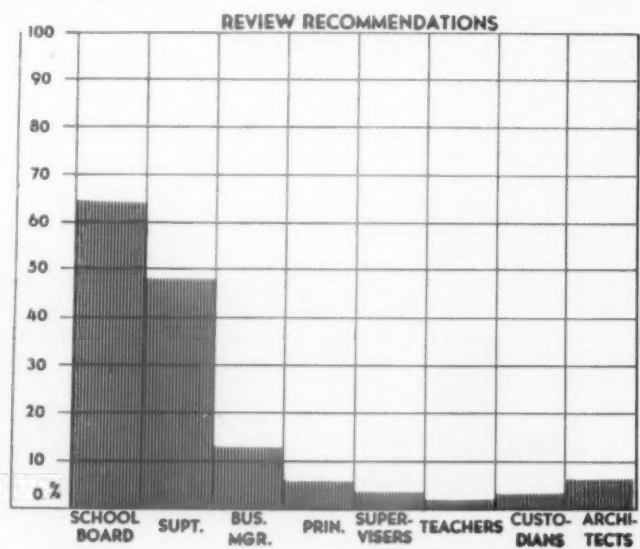
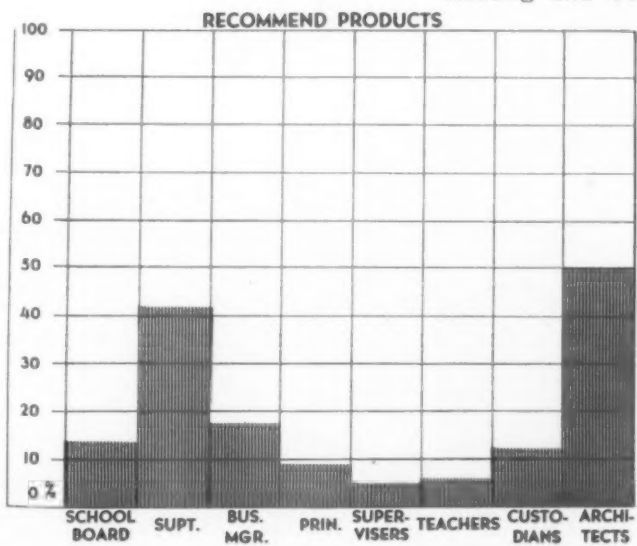
## Audio-Visual Equipment



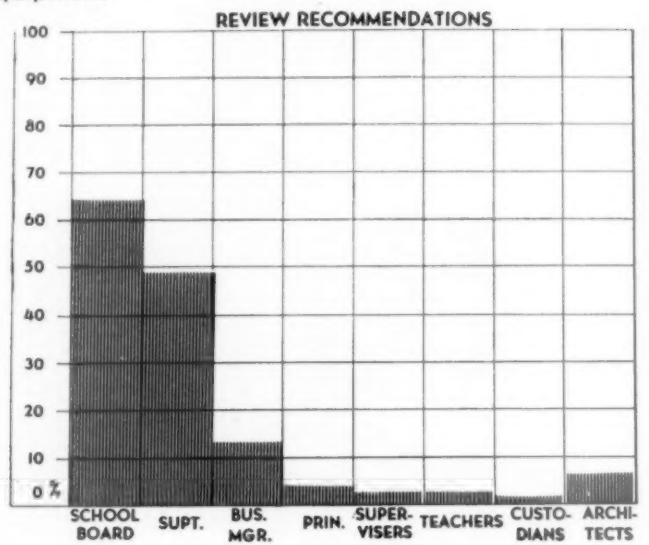
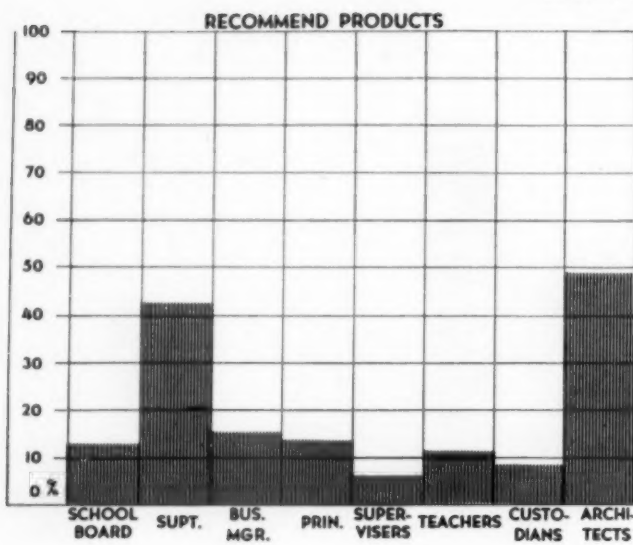
## School Buses



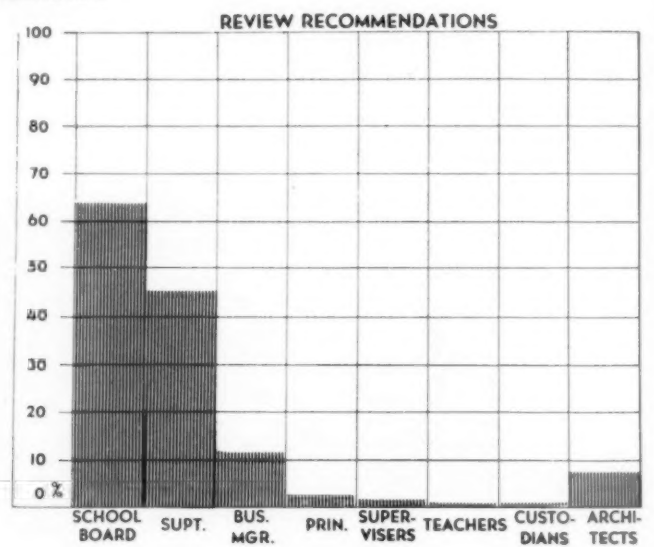
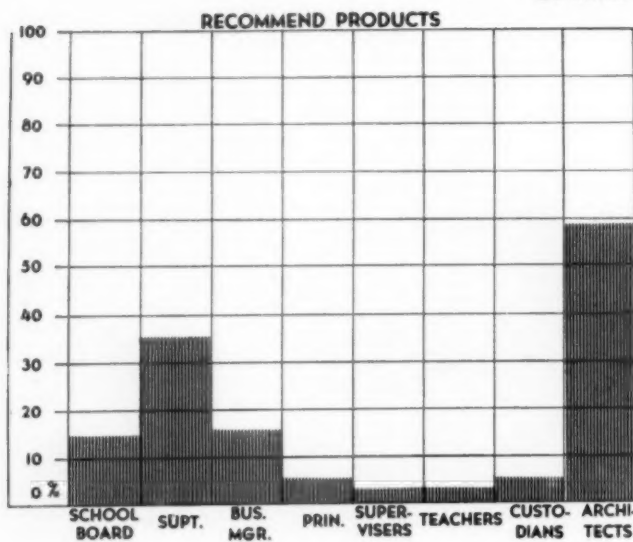
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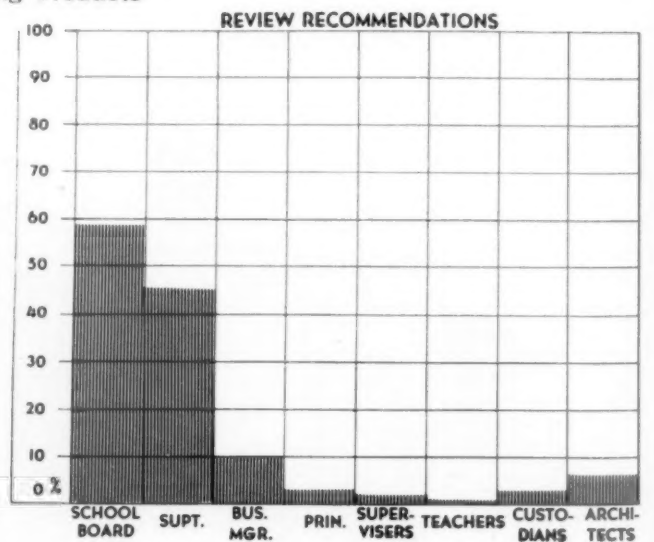
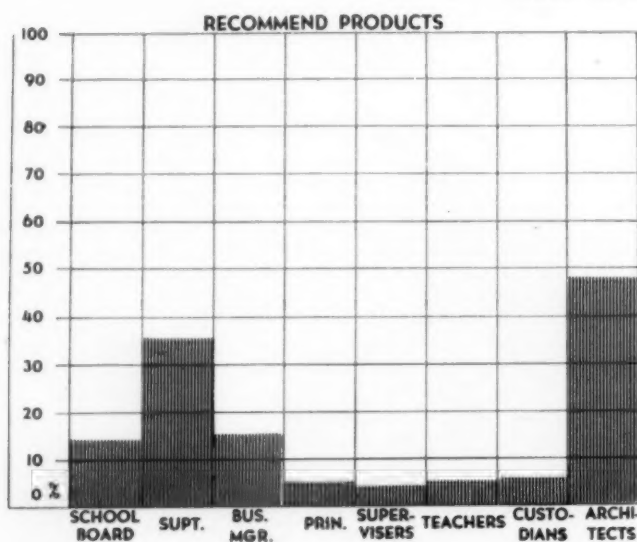
## Lighting Equipment



## Structural Materials

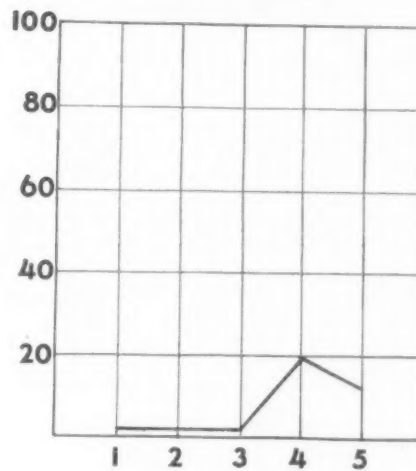


## Other Building Products

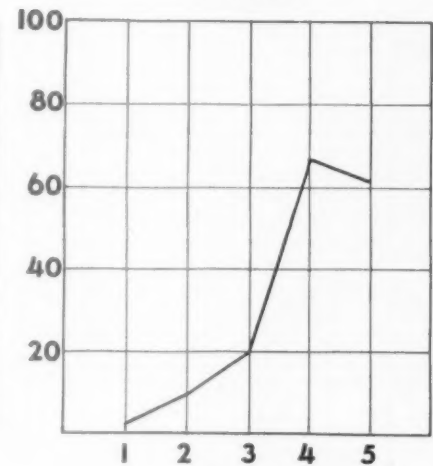


## School Boards

Recommend

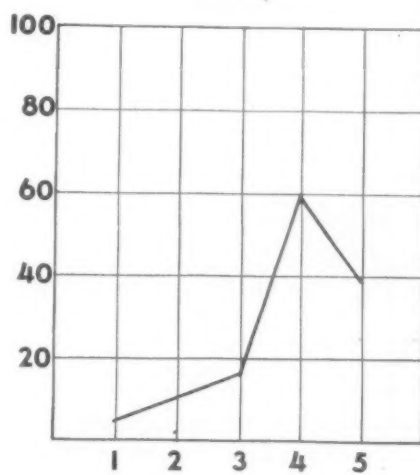


Review

Third Series of Charts  
Summarizing First and  
Second Series

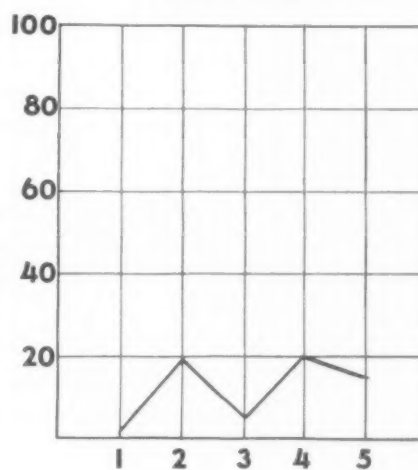
Superintendents

Recommend



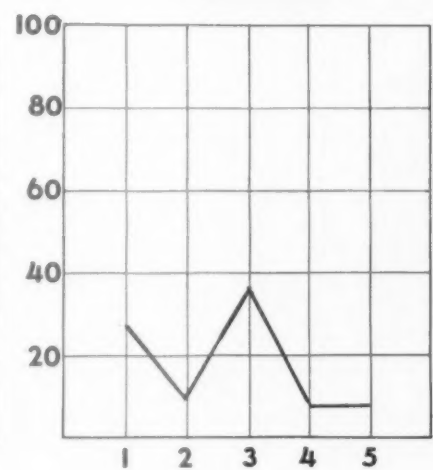
Business Managers

Recommend

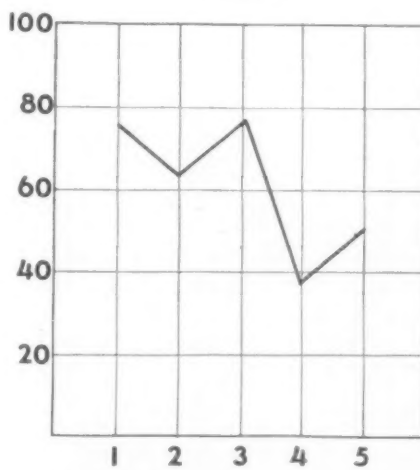


Principals

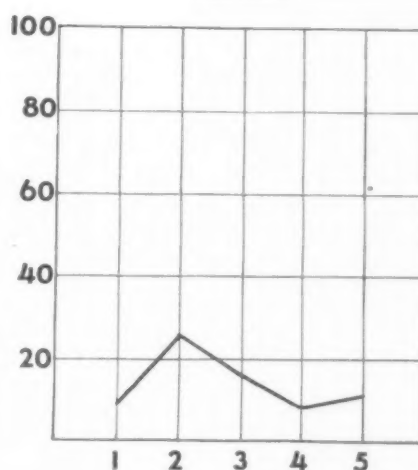
Recommend



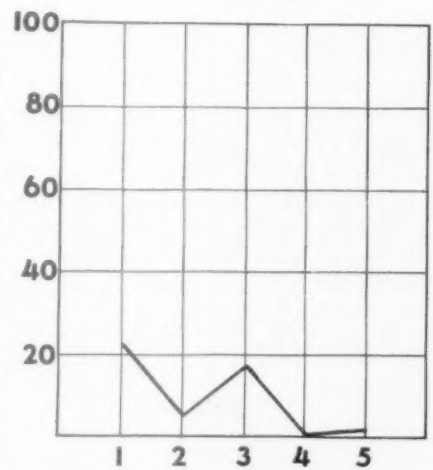
Review



Review



Review



Key to classifications:

1. Teaching, library, pupils', and physical education supplies

2. Custodial and maintenance supplies

3. Classroom, laboratory, shop, cafeteria, homemaking and physical education equipment

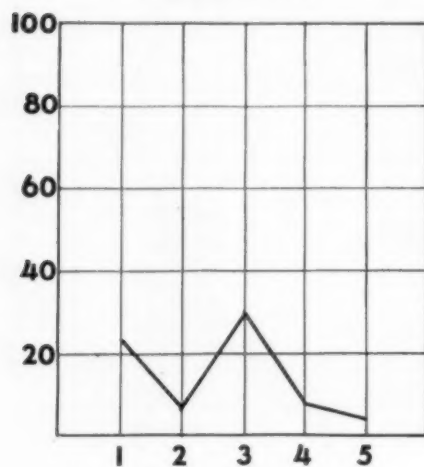
4. School buses

5. New school buildings and additions

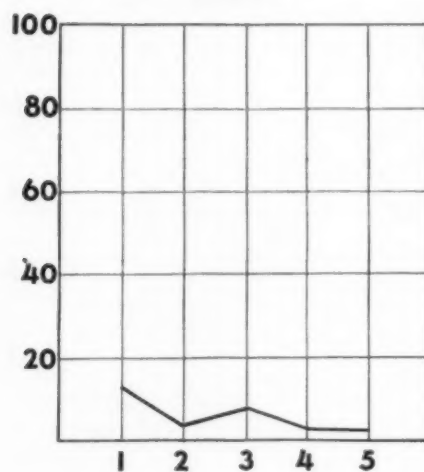


## Supervisors

## Recommend

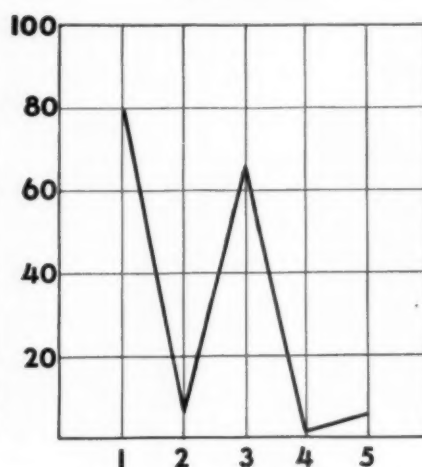


## Review

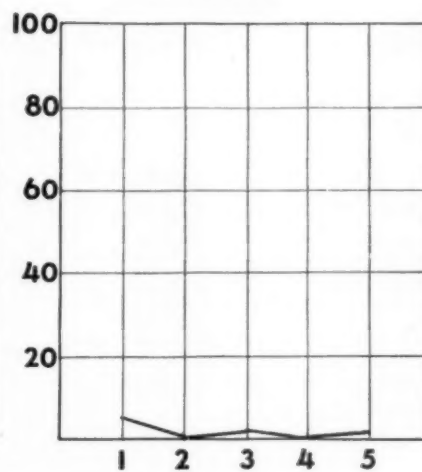


## Teachers

## Recommend

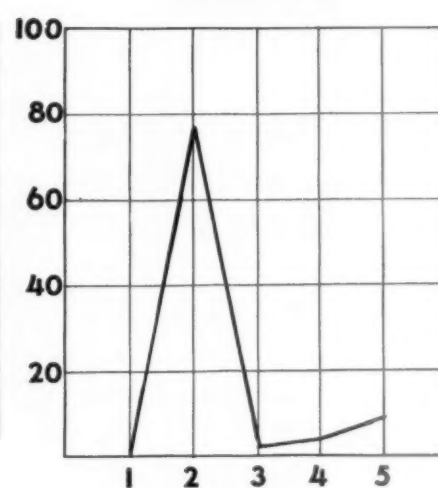


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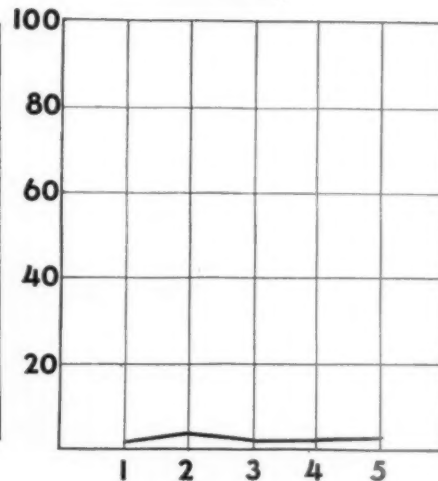


## Custodians

## Recommend

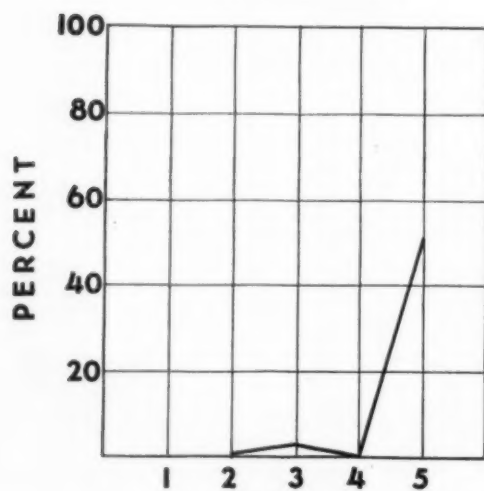


## Review

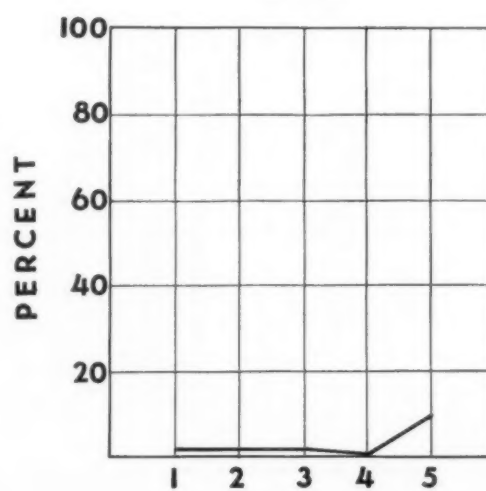


## Architects

## Recommend



## Review



# THE SELECTION OF FINISH HARDWARE FOR SCHOOL BUILDINGS

By A. S. NIBECKER, JR.

Business Manager, Los Angeles Board of Education, California

**S**ELECTION of the proper finish hardware in school buildings is a matter of great responsibility and importance. Safety, durability, design, finish, and cost are some of the main factors.

## Safety

Safety devices should consist of fire exit bolts, semi-automatic door bolts, locks, thresholds, door holders, door stops, and door closers.

Fire exit bolts should be fixed on all exit doors from corridors, auditoriums, gymnasiums, large assembly rooms—in fact, on all rooms occupied by a large number of students. The semi-automatic bolt should be used for pairs of interior doors to academic rooms where ordinances or regulations do not require panic bolts.

Locks or latches that are operative from the room side without the use of a key should be furnished normal size classrooms, shops, offices, and other rooms used by students and faculty. These locks should also have an auxiliary latch for added security.

Cylinder locks with thumb-turn on room side are needed on all storage and supply rooms, custodians' closets, and all rooms requiring protection.

In general a dead lock or latch should not be used for any room or space (unless required by regulations or ordinances) which cannot be opened from the room side without a key to avoid "locking-in" students, faculty, or school personnel.

Doors to public or students toilets should close with pulls and push plates in preference to latches or

Mr. Nibecker, Business Manager and Architect of the Los Angeles Board of Education, received his B.Arch. at the Massachusetts Institute of Technology. He is a member of the American Institute of Architects and has been on numerous committees dedicated to school building problems. He was one of the early organizers of the California Association of Public School Business Officials and is now finishing a term as president of that organization.

locksets, since these doors are used constantly and the wear on locksets would be excessive. Closing devices, of course, should be used with this arrangement.

Metal thresholds for exterior doors should project as little as possible above the floor, but afford protection against wind, rain, and dust. They should be free from grooves and undercuts for ease in cleaning. For interior doors they should be flat and narrow.

All doors should have bumpers or stops in order to prevent damage to walls and to the hardware trim. Doors which are intended to remain open most of the time (particularly exterior exit doors which are exposed to wind) should be equipped with combination bumper and door holder. Floor-type holders or bumpers are placed close to the wall or partition, under an open railing, or any other location out of the path of travel, to eliminate hazards or possible injury by tripping or falling.

Door closers are used on exterior doors, interior doors to toilets, and similar rooms where doors are to remain closed when not in use. These are necessary for interior corridor doors in windy localities. Closing devices may be either exposed overhead type or con-

cealed type. The overhead type may be lower in cost and is more easily accessible in case of repair. The concealed type has better architectural appearance and does not restrict the head room in an opening.

#### **Durability**

Finish hardware must be the most durable for its intended location and use. Only hardware of well known manufacturers who furnish the best quality materials and expert workmanship should be considered. School buildings are subject to hard usage and sometimes abuse, and the best hardware obtainable is none too good. Heavy-duty hardware should operate easily, and be of quality and design that require the least maintenance.

Room doors are equipped with three butts, not only for the purpose of preventing warping of the doors but to withstand hard usage. On exterior doors and doors to classrooms, offices, toilets and the like it is desirable to use ball-bearing butts for durability. Butts should be of the proper size so that doors may swing freely without striking the edge of the jamb, preferably opening 180 degrees on straight wall surfaces.

#### **Design and Finish**

Hardware design should be plain, smooth, with rounded or beveled edges, free from indented, paneled or raised lines and contours for ease in cleaning. Locks for room doors, equipped with long-lipped strikes to protect the trim, are made with a curved lip to avoid possibility of tearing clothing. Hardware should be tamper-proof and should require special tools for adjustments rather than ordinary screw

drivers and pocket knives which students can use.

Finish should be plain, free from lacquer or protective coatings. Exterior hardware of cast bronze with dull finish will not require polishing or further maintenance. Interior hardware may be either plated to match the exterior hardware, or primed for painting in rooms to receive a painted or enameled finish. Chromium plated finish will be more durable in toilet rooms, kitchens, shower rooms, and rooms exposed to moist or damp conditions.

#### **Cost**

Cheap hardware has no place in a school building. Although the first cost of good hardware may not be the last cost, considering the elimination of expensive repairs and replacements, and the safety of students, faculty and personnel, the best is none too good.

#### **Masterkeying**

All locks on a school site should be masterkeyed, so officials will not have to carry more than one key. It may be necessary in certain cases, however, to key special rooms separately where only authorized personnel are permitted access to the room. A key cabinet is a good place to file all keys, and care should be taken that they are properly identified. When keys are loaned to school personnel, a receipt form should be filed and properly signed to insure their return.

#### **Miscellaneous and Cabinet Hardware**

Miscellaneous and cabinet hardware should fit the design and use of the various cabinets. In general, hardware should be sturdy enough to stand hard usage and render long satisfactory service.



# DRY-JOINT MASONRY

By HARVEY MILLER

Architect, Washington, D. C.

**S**TRUCTURES built over 1800 years ago still stand in silent testimony to "mortar-less" masonry. The Roman Aqueduct at Segovia, Spain, constructed in 98 A. D., is approximately three-fourths of a mile long, about 80 feet high in the center, and about 9 feet wide. It has 119 arched openings in two tiers, and yet *no mortar was used in the masonry.*

A vast parabolic-vaulted palace standing today at Ctesiphon, Persia, was erected in 220-620 A. D. of sun-dried mud bricks. Neither was mortar used in those famous architectural phenomena, the Egyptian pyramids.

## Plan Is Entirely Practical and Workable

The writer has given a great amount of thought to the dry-joint method. Being a practical man, with twelve years' experience as a carpenter, cabinetmaker, and machinist, he is convinced that this method is entirely satisfactory. He believes, furthermore, that no ruling exists which would prevent a union mason from working on a masonry system such as will be described in some detail in this article. This method would not mean less jobs for masons since, very likely, more masonry work would be in demand.

## Saves Time and Expense

Whereas one experienced man using the trowel method can lay approximately 900 brick per day, one *inexperienced* man can lay 9000 brick per day using the dry-joint method. Naturally, the latter method results in a great saving of mortar. In fact in the trowel method face brick is apt to be stained by cement. No such danger is present in the dry-joint method—regardless of the quantity of cement used in the grout mortar. Not even freezing temperatures hold

up construction; the walls can be laid dry, to any height, and grout mortar poured when the weather permits.

Nailing blocks and plugs, acid-cleaning face brick, and cleaning spattered mortar off lumber and other materials are all unnecessary in a dry-joint construction, thereby eliminating considerable cost.

Vines, so important to many types of architectural design, which grow on trowel mortar joints cause the joints to disintegrate. Where dry-joint is employed, the roots of vines grow into the joints, giving the walls additional strength.

During the construction of any building a foreman carpenter lays out all the work from a dimension standpoint, sets window and door frames, and keeps a close watch on all the work. Under the guidance of the foreman, men inexperienced in bricklaying can build a dry-joint wall.

## Wall Tie Specifications

Wall ties should be made of one-half-inch strips of 16-ounce copper or zinc. (The rust-resistant quality of these metals make them advisable.) The strips should be about three-quarters of an inch less than the thickness of the wall. For use in a 9-inch wall, approximately 24 perforations should be made through the ties with a round, slender, sharp-pointed punch. These perforations should be staggered for extra strength and half made from one side of the tie and half from the other. Burrs formed by the pointed punch will hold the ties firmly between the bottoms and tops of the bricks or back-up materials.

It would be to no advantage to use brick headers in place of metal ties. Headers do not bond properly with back-up materials. Besides, they break up the

motif in pattern brickwork and create the danger of air pockets forming in the grout mortar.

#### Face Brick and Back-up Material

Exterior face brick (including the hollow tile, brick, or concrete masonry unit back-up material) of a 9-inch wall should be laid dry; one unit against the other, and no mortar used in either horizontal or vertical joints. Between the face brick and the back-up material, an open space about one-half inch wide should be provided for the grout mortar. For a 13-inch wall, two open spaces should be provided in the wall for the grout mortar, and the length of the ties increased.

The first course at the bottom of the wall should be laid in a stiff, thoroughly mixed, 1 to 3 Portland cement and sand mortar with 10 per cent lime (by volume) added. After this course has been pressed perfectly level and allowed to set, the dry-joint material should be laid. The ties should be staggered in the dry-joints—usually one tie for every square foot is sufficient. When the weight of the wall rests on these burred ties, they can be removed only with great difficulty.

To avoid injuring newly poured grout-mortar joints in the parts of the walls that meet floor and roof construction, the copper or zinc ties should be placed in the third brick course which occurs just below the tops of the metal joist hangers. If the back-up material differs in thickness from that of the face brick, the ties may be bent up or down, according to their placement.

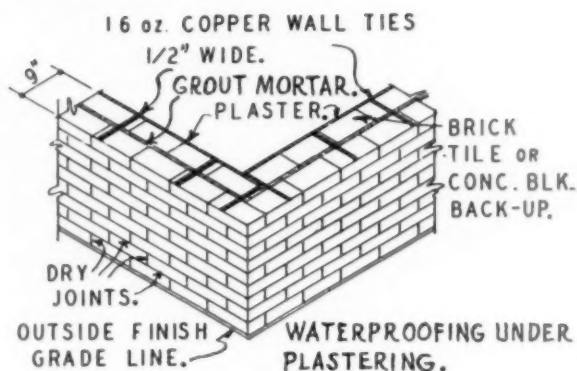
Where no frames are required, the jambs and finished ends of walls may be provided with one copper tie for every two bricks. A thin layer of stiff mortar will close any air pockets which form at corners or jambs.

Any mortar which accidentally runs onto the finished wall faces should be wiped off immediately with a clean damp sponge. Watering of the bricks or back-up material is not necessary when grout mortar is used; it will adhere to dry vitreous bricks. In fact, if an attempt is made to remove the brick, portions will break off and cling to the mortar. On the other hand, trowel mortar will not adhere to vitreous bricks—even if these are wetted. Furthermore, workmen find the handling of wet bricks, used in the trowel method, very uncomfortable.

#### Construction Details

Grout mortar should consist of one part gray Portland cement (of a kind used in reinforced concrete) and one part sand with 10 per cent (by volume) of lime added. Small mullions and piers should be reinforced by placing steel rods in the grout mortar joints.

At the ends of steel angles which occur over openings, the brick and back-up material should be cut out on the bottoms to fit. Standard anchor bolts should be set, as required for securing plates, in the grout mortar joints. Where flues occur, the grout mortar joint between flue linings and brick or back-up material



9" DRY JOINT BRICK WALL

should be about 1 inch thick. Wherever there is wood framing, one-half inch mortar or sheetmetal should be installed on the outside of the chimney.

Stone and brick copings should be set with trowel mortar. Vertical joints in these copings may be filled with grout mortar (except where stone pointing occurs). White non-staining Portland cement should be used in mortar which will contact stone.

#### Placement of Copper Flashings

Through-wall-ten-ounce copper flashings should be placed in all mortar joints under stone copings, stone sills and over all windows and doors which are exposed and in brick joints under the last brick course which forms the tops of the walls. Flashings should be on a line with inside wall surfaces and should be 12 inches longer than the width of outside brick openings, thus forming air and water checks. Where copper comes into contact with other metals, insulation must be provided.

#### Support of Wood Joists

In wood joists or other framing which extends into masonry walls (built by either trowel or dry-joint) water penetrates over four inches into the brick at the ends of such framing, causing dampness on inside surfaces. Constant moisture tends to rot the ends and make food for termites. Therefore, where supported by outside masonry walls, the joists and framing should be hung in metal hangers and waterproofing applied on the walls outside the ends and sides of such woodwork.

#### Waterproofing

Exterior wall faces should be waterproofed up to 4 inches from finished grades, with a half-inch mixture of 1 to 3 Portland cement and sand mortar (standard building code specification). Waterproofing of outside walls back of plastering and other finish consists of two heavy mopped-on coats of a coal-tar and asphalt mix. These coats must extend in between and behind the ends of joists and other framing supported on exterior masonry walls. Metallic waterproofing could also be used instead of the coal-tar and asphalt. Membrane or metallic waterproofing should be applied to

outside wall faces below grades, as required by water conditions.

#### Exterior Openings

The outside box members of wood window frames should have sixteen-ounce copper blades let into saw-cuts in such frames, forming water and air checks. Plank door frames should have continuous sixteen-ounce copper blades let into the backs to form air and water checks.

Arches over exterior openings may be formed by laying the bricks on a level surface of wood or other material and pouring grout mortar around them. When properly dried, the arches can be set bodily into the walls. If the arches are so constructed that they are as wide as the thickness of one brick, one-half inch of grout mortar may be poured in back of them after they are set in place.

#### Second-Hand Bricks

Cleaning mortar off bricks which have been removed from cement and sand mortar walls is more expensive than purchasing new bricks. If second-hand bricks are used, trowel mortar should be applied along the sides of the grout-mortar joints where needed, and in some of the joints if necessary, to level the walls properly.

Second-hand bricks of different thicknesses should be used in walls below the finished grades. If inexperienced workmen are to handle the trowel mortar, it should be extended only to the wall faces—damp-proofing and plastering will conceal all irregularities.

#### Veneered Walls

Where dry-joint is used, veneered walls may be constructed in the same manner as brick exterior walls: the ties bent to shape and secured to the wood sheathing with large head copper nails. So that the ties will not be weakened by the large nail holes, the ties should be three-quarters of an inch wide.

Heavy waterproof felt or one-half insulation board should be placed between the sheathing and grout mortar. If both felt and board are used, the job will be more satisfactory.

#### Air Cushions

The grout mortar, extending from the tops to the bottoms of the walls, forms air cushions which prevent rain from blowing into the exterior dry-joints. To observe this, during a rain storm watch the straight line cracks under the sills of exterior doors and casement sashes. The water will not enter the building from under these sills unless the air cushion is released by opening some other window or door in the building.

Air, passing around the exterior bricks in dry-joint walls, allows them to dry quickly after a rain, and also cools them after hot weather.

#### Pointing Mortar and Effects of Cold Air

Hairline cracks form around pointing mortar and allow water to enter the joints. Any outside masonry

wall which is exposed to cold, regardless of the type of construction, will allow the cold to penetrate the entire thickness of the wall. Trowel mortar will not correct this condition.

In rooms where there is a lot of steam, such as kitchens, furring is sometimes provided on the inside of the walls; however, this does not stop condensation entirely. The cold still penetrates the plaster and causes the steam to condense on walls and ceiling.

#### Laying Dry-Joint Walls

All dry-joint units are laid from the inside of the building, thereby eliminating the expensive scaffolding necessary to the construction of first-class trowel-mortar walls.

The tops of curtain walls must be anchored or doweled to the spandrel beams. (During a Miami, Florida, storm, the trowel-mortar curtain walls were blown out of hotels and other buildings.) Quick-drying cement could be used advantageously in dry-joint walls, but should be thoroughly tested before use. One small plugged mortar inspection hole should be provided for every 40 square feet inside of wall surface.

#### Must Fight Tradition

Of course it is difficult to draw the public away from traditional methods of masonry construction. A model of a dry-joint wall may be made very simply with wood blocks about the size of dominoes and thin strips of paper to represent copper wall ties. Better still, an actual sample may be constructed as a test wall. This dry-joint brick wall should be large enough for the units to have a proper number of broken vertical joints for grout mortar. The mortar which runs into these vertical joints and in the horizontal joints will make the wall rigid. As the size of the wall is increased, the weight of all the materials will add to the strength.

#### Effective Appearance

Any kind of pattern brickwork can be built with the dry-joint method by breaking the bricks in the center to form headers and going on from there. Extensions to trowel-mortar walls can be made very easily by installing metal dowels in the joints of these walls and then pouring the grout mortar of the new dry-joint walls around the dowels. Horizontal joints which are not on the same lines are not objectionable; caulk joints between old and new walls are on the inside.

From an artistic viewpoint, dry-joint walls are very effective. The shadows around the bricks offer a three-dimensionality which cannot be achieved with trowel mortar. Except for monumental buildings and light-tone painted brick walls, a range of nine tones of brick is suggested.

Although trowel-mortar walls take a long time to lose their "raw" look, dry-joint brick walls give a mellowed, aged appearance at the time of erection.



## **GOOD BUSINESS PRACTICES: A SYMPOSIUM**

### **Fire Prevention Program**

**By HERBERT S. MITCHELL**

**Business Manager, San Bernardino City Schools, California**

**T**HE FIRST requisite in a good fire prevention program is to develop a cooperative working relationship with the local fire department. "The latch-string should be out" for representatives of that department at all times. They are specialists in their field and will recognize hazards that the untrained person will not observe.

In cooperation with the fire department a fire prevention handbook has been developed for special use in our school system. It includes simple but specific information pertaining to fire-alarm signals; notification of the department in case of emergency; fire drills; fire prevention inspections; and pertinent excerpts from state and local ordinances.

Principals and custodians have this book and are thoroughly familiar with its contents. It is also used as a basic text in the in-service training of custodians. At an annual meeting, the fire department conducts

a program in which the custodial and maintenance staffs also participate. Part of the program is devoted to the use of the proper kind of fire extinguisher for specific kinds of fires. In these demonstrations custodians use the equipment so that they may get the "feel" of it for more effective use in an emergency.

We have also developed a questionnaire form of report that follows the general line of report suggested by the Fire Underwriters Association. However, it is designed specifically for our own school system and the inherent dangers in our school buildings are emphasized. The principal and custodian prepare the report jointly and both sign it.

The reports are made quarterly and unsatisfactory conditions are investigated and corrected. We are considering establishing a rating system for the quarterly reports and the issuance of a "certificate" to those schools that attain a high degree of efficiency.

## **Accounting for Cash Collected by Individual Schools**

**By JOHN T. CATE**

**Business Manager, Glendale Unified School District, Glendale, California**

**A** DEFINITE procedure for school principals to follow in accounting for charges for the use of, loss of, or damages to, school property and subsequent collections therefore is a very good school business practice. The following routine is prescribed and followed in our district:

Standard pre-numbered triplicate receipt forms, in padded sets of fifty, are furnished to each school principal. These forms are used in connection with the collection of monies received by any school district officer or employee for the account of the district, with the exception of book fines. These collections are recorded and reported on prenumbered duplicate subsidiary collection report forms furnished to the principal. The entries on these report forms are made by the person paying the fine, setting forth the date

of payment, amount paid, and signature of the payer.

The librarian deposits her collections and the duplicate copy of her collection reports with the secretary or authorized person at the close of each month or whenever the collection total equals \$5.00.

The secretary or authorized person prepares a triplicate receipt for the amount of the deposit and delivers the original to the librarian as an official receipt for the deposit. The librarian retains the original subsidiary collection report forms and triplicate receipt forms for her files.

All charges for lost books, property damages, etc., are based upon an authorized standard charge whenever possible and an official record is maintained in the school principal's office for all authorized charges. This record must show the date of collection, amount



that was paid, and official triplicate receipt number.

The secretary to the principal of each school, or other duly authorized person, deposits all monies collected and one copy of the related receipts and subsidiary collection reports with the business office accounting department in accordance with the following schedule:

*Elementary Schools*—at the end of each month or whenever the collections total \$10.00, whichever is first.

*Junior High Schools*—at the end of each month or whenever the collections total \$20.00.

*High Schools*—at the end of each month or whenever the collections total \$50.00.

*Evening High School*—at the end of each week or whenever the collections total \$200.00.

*College*—at the end of each month or whenever the collections total \$50.00.

The receipt forms provided through the use of "Wiz" machines may be substituted for the prenum-

bered triplicate receipt form and will be subject to the same accounting routine.

A standard form of prenumbered refund receipts, in triplicate, to cover refund of lost book payments, etc., is also furnished principals.

It is important that good carbon paper be used in writing prenumbered receipts inasmuch as worn-out carbon paper produces an illegible copy for the use of the accounting department. The duplicate copies of authorizations for charges are sent to the accounting department.

The business office accounting department maintains the necessary records to account for all prenumbered receipt forms, used or unused. Each school returns the unused receipts and refund forms to the accounting department at the close of each school year for audit verification. All voided receipt forms are cleared with the used forms to the accounting department so that all receipt numbers and the original of the voided receipts may be accounted for.

## Salvaging Minor Educational Equipment

By JOSEPH L. ERNST

Director of Purchases and Stores, Board of Education, Rochester, New York

WHAT can be done with scissors and shears when they become dull, or with a pencil sharpener when the cutter no longer produces a satisfactory point? Band and circular saws need brazing and sharpening, hammers require handles, and so on down the line of smaller items of equipment. Many tools of this type can be salvaged, repaired and reconditioned to save a school system money and material.

A good method of taking care of the minor pieces of equipment is to use a system such as the army does: a teacher or school returns to the storehouse a broken or unusable article and receives in exchange a new or reconditioned counterpart and no credit or debit is entered on the books.

We find it convenient and economical to turn over to the repair section of our storehouse such items as well as many others, for inspection, replacement, or discard as common sense and experience dictate. This section has for equipment several relatively small machines for saw filing, setting and brazing as well as a grinder and drill press.

As an indicator of cutting tools handled in a twelve-month period, our tool repair section reconditioned nearly 3,000 items. Included were the following:

- 395 circular, mitre, back, and hand saws set and sharpened
- 166 band saws set, filed, or brazed
- 1,013 plane blades sharpened
- 369 scissors and shears reconditioned

131 pencil sharpeners reconditioned  
Other items—bits, planes, hand drills, drafting instruments, electric soldering irons, mitre boxes—were repaired and put back into circulation.

Another project of the repair section is the reconditioning of health education items, such as sewing worn or torn cases, and repairing or replacing bladders in various types of balls. We also rebuild musical instrument cases.

Two men are engaged in servicing office machines such as typewriters, calculators and registers. An accurate record is kept of our more than 2,000 machines showing the number of times serviced and the type of service rendered. This includes machines in offices as well as educational equipment for commercial classes. During a year more than 1,200 machines are handled. Sometimes a group of typewriters are reconditioned in a classroom. In other cases, machines are brought into the repair section, usually when an overhaul is necessary. Servicing includes cleaning, adjustments, or parts as may be required to put a machine in good working order.

When articles such as tools or balls are beyond repair they are listed as salvage and destroyed or sold for scrap. The storehouse is then given credit on inventory for all disposed of items.

This type of repair work pays for itself in dollar value, is convenient, and saves effort and time in sending equipment elsewhere for reconditioning.

## Preparing the Annual Budget

By **RUSSELL J. FLANAGAN**

Assistant Superintendent in charge of Business, Board of Education, New Haven, Connecticut

**P**REPARING the New Haven, Connecticut, school system's annual budget, which is nearly \$5 million, is not a one-man job. We draw upon all members of the staff whose responsibilities are such that they can make a worth-while contribution. Each receives a definite assignment which is fulfilled by the presentation of detailed schedules to support the amount requested.

The assistant superintendent in charge of elementary schools, for example, prepares a schedule listing the professional personnel in each elementary school. For each principal or teacher listed, information is given concerning number of years teaching experience, most advanced degree, current salary, increments requested, and new salary figure requested. He also prepares schedules showing the individual needs of each school in terms of instructional supplies, textbooks, library books, equipment, etc.

For the junior and senior high schools, the assistant superintendent in charge of secondary schools prepares similar schedules of personnel and other needs. The director of adult education, director of pupil services, supervisor of audio-visual education, and other supervisors assume a similar responsibility for their respective areas.

The director of buildings and grounds with the aid of his assistant director prepares a schedule listing under each school the engineers, custodians, and other personnel under his supervision. Following each name is shown the years of service and other elements making up the salary requested.

A similar schedule is prepared for the account covering building repairmen (carpenters, steamfitters, painters, etc.). One of the largest non-salary accounts is for school repairs. With this request, the director of buildings prepares a schedule of specific repairs and renovations needed, school by school, plus allowance for emergencies and contingencies.

Another large non-salary account is fuel. For this item, the director of purchases prepares a schedule of the probable fuel requirements of each school.

The department of education, like all other municipal departments in the city, is dependent upon appropriations made by the board of finance. Since the budget for education is much larger than that of any other department, it is viewed with some misgivings and studied very closely. To minimize the inevitable skepticism and slashing which follows the annual budget request from the department, the board of finance is presented with a bound book of these detailed schedules supporting each account for which an appropriation is requested. The book of schedules which accompanied the budget requests for 1950 contained nearly 150 pages of mimeographed legal size paper.

The value of this book does not end with the preparation of the budget request and its presentation to the board of finance. With such revisions as are necessitated by the action of this board and such corrections as changes in personnel require, it serves as a bible in the administration of the budget and an indispensable reference for administrative personnel.

## Selling the Budget

By **J. M. BARRETT**

Business Manager, Board of Education, Flint, Michigan

**T**HE PREPARATION of public school budgets can be made a good method of presenting school needs to parents, employees, and the general public if budget plans are gone over with representatives of all groups. In Flint, the superintendent of schools suggested that problems in preparing the budget be discussed with all groups interested in the schools. While we probably did not reach all organizations in presenting budgetary plans for the 1949-50 school

year, results were so satisfying that the plan will be continued.

The teachers' salary committee and the PTA Advisory Committee spent more time studying budget problems last year than any other group. Teachers are better satisfied with their salary schedule, and PTA groups are better satisfied with class sizes, classroom lighting, and building problems than they would have been had they not participated in the budget.

When all the needs of the schools are presented in conjunction with the funds available for the year, there is a tendency for all groups to consider the proper distribution of funds to meet the school sys-

tem's overall needs. All selfishness does not disappear, but when a group considers how \$10,000 can do the most good for a school system self-interest is pushed into the background.

## Organization and Operation of the Business Office

By **ELDON HUTCHINSON**

Board of Education, Okmulgee, Oklahoma

**O**KMULGEE is particularly proud of the organization and operation of its business office. Visiting superintendents frequently tell us they wish they could have such a working organization. All of us are familiar with the best in theory, but few schools achieve a workable business organization which functions as effectively as ours does.

Our business office, located in the board of education building, is part of the administrative organization of the schools which has as its head the superintendent of schools. In the business office are the treasurer and clerk of the board of education. The clerk is purchasing agent of the board and has supervision of the business office.

The treasurer in addition to responsibility for the moneys of the schools, serves as secretary of the office

and chief attendance officer which affords full-time employment. All budgets are prepared by department heads, principals, and supervisors, and approved by the superintendent of schools and the business office.

All purchases and payments are made by the business office by cashable checks instead of warrant, which gives more satisfactory relationships with all concerned. All activity funds are handled in the same manner. No individual or group is allowed to carry separate cash accounts. The departments may spend their funds as they see fit, but all orders and payments are made by the business office.

Under our business practice the board of education very seldom has anyone bothering them about the business of our schools.

## Friendliness, Fairness, and Firmness Pay Dividends

By **MONROE MELTON**

Business Manager, Board of Education, Louisville, Kentucky

**F**RIENDLINESS, fairness, and firmness are practices which should prevail in school business management. If adhered to consistently, they not only benefit schools and administrators, but the dividends increase like compound interest.

As business managers in public schools, we are public servants. Through the public schools and by this service we earn our livelihoods. Schools operate for the benefit of the children who attend them, and are paid for by their parents and other citizens who have a vital interest.

Those who are served and pay the costs are entitled to friendly consideration of their interests and problems by those of us who manage the schools. Many tax rates are raised, many budget increases indorsed, and many bond issues approved because the administrators are friendly—and correspondingly are the recipients of good will.

Fairness—fair consideration of every problem, de-

cisions based on all factors involved and the interests of all parties concerned is a necessary policy for every successful administrator. Consistent practice of this policy builds up and maintains confidence. Without it our usefulness is soon dissipated.

Firmness in maintaining a decision reached, a conclusion formulated, or a policy established is fundamental in successful administration. To stand firm when pressure groups and selfish interests clamor for recognition of unwise demands commands respect, not only from those whose hopes and wishes coincide with the purposes and needs of the schools, but also those who advocate irrelevancy.

Friendliness, fairness, and firmness are basic traits in successful school management. With diligent application of them we should succeed. Without them we can but fail. Thrice blessed are the schools whose administrators merit and possess the good will, confidence, and respect of those they serve.



# ECONOMICAL MAINTENANCE OF A SCHOOL SYSTEM

By R. M. FRENCH, Jr.

Miami, Florida

**T**HE FLEXIBILITY to handle any job and the know-how to do it better for less, describes the maintenance department of the Dade County, Florida school system. Operating from a central warehouse in Miami, under the supervision of E. F. Hurst, a crew of 150 permanent employees at present is caring for 98 schools with an enrollment of 60,000.

"While our expenditures last fiscal year exceeded \$1,200,000, we expect to do our job this year on between \$700,000 and \$800,000," Hurst revealed.

The present department has grown from a fifteen-man unit during the war years. James T. Wilson, county superintendent of education, realized it would be necessary to revamp the system's maintenance group when the war ended.

"Practically no work had been done during the war and we had experienced a terrific population increase which had swamped existing facilities," Dr. Wilson said. "It was obvious that if we were to do our job, expansion of existing facilities was imperative and a complete overhauling of all our property was mandatory. Hurst has built the maintenance unit to fit our needs."

To Hurst it is not the size of his department but the numerous small individual problems that must be met and solved that give the job its fascination. Last year, for example, on just three maintenance items, he was able to effect savings annually of more than \$10,000 by doing the job better for less.

"We feel maintenance cannot be a cut and dried matter. Each school has its own special headaches and demands and it's up to us to make the shoe fit the foot, so to speak," he declared.

## Cut Cost on Maintenance

Two maintenance jobs that annually cost Dade County taxpayers a considerable sum were bicycle racks and backstops for outdoor basketball. The old style wooden bicycle racks, for example, actually cost \$17.50 each and held twelve wheels. Their life was about two years. Hurst has just invented a concrete rack which costs \$1.00 per bicycle and has an estimated life of at least ten years.

"We are making patterns now to turn out 4,000 of these racks," Hurst said. "We are proud of this job because in addition to a lower cost, we can move

this new rack, for one bicycle or fifty, with no trouble. Also, the students find it doesn't damage their wheels as did the old style."

Boiler plate has solved the backstop maintenance problem on outdoor courts at a saving of about \$1,000 annually to the county. Again, on this item Hurst has done it better for less. The quarter-inch plate costs \$9.00, compared with \$17.00 for the wooden backstop.

"Honestly, even without painting, I believe that metal backstop will last fifteen years at least," Hurst said. The old style had to be replaced roughly every 24 months.

Hurst's department eliminated another headache by putting portable bleachers on wheels. Florida schools, in their year-round mild climate, make full use of bleachers with frequent outdoor events. Until Hurst worked out the rolling grandstand, it took a full day to erect grandstands and another day to knock them down, so it was almost impossible to get more than two days' use a week from them. Now, however, with the units on wheels, bleachers may be towed to the desired location. Because stands are permanently put together, the cost of replacing lost parts—a particular problem with knockdown stands—is eliminated. The cost for each move last year, in which the old type stands were shifted 50 times, was \$100 per move. This year, the \$5,000 has practically been erased from the budget.

## Rubber-Tire Standards

Another piece of equipment which has cost the school system between \$500 and \$1,000 a year has been volleyball standards. Hurst has greatly pared down replacement expenses of these units. A worn-out automobile tire with a concrete-filled center is the base for new stands. A piece of one and one-half inch galvanized pipe eight feet long, placed in the center, is the upright. "These cost us \$6.50 each compared with \$10.00 formerly," Hurst said. "We feel these new stands will last at least ten years compared with two years for the old wooden type. And besides, they are safer since they are extremely difficult to tip over."

When Hurst gives cost figures he's not guessing. Accurate job cards are kept on all work and the





Portable bleachers may be towed to desirable locations.

school central accounting office has complete reports so that maintenance costs for each school are quickly available. "By so doing," Hurst pointed out, "we know accurately the life of equipment in this climate and just how to set up our budget annually."

One of Hurst's biggest jobs now, and for several years to come, is to set up and maintain portable classrooms. The county now has 476. "With the area growing so rapidly—an increase of 6,700 students this fall over last year—we have a real job keeping the classrooms where they are most needed," Hurst said. He moved 60 of these rooms last year and expects about the same number of shifts during the 1949-50 fiscal year. "Despite a building program which covers the county we are not able to keep up with the population increase," he said. "I know of one new school for 900 students just opened this fall, that has had to keep 28 portables to care for the increased attendance."

By standardizing on most items, plumbing particularly, Hurst has been able to speed up maintenance repair work and reduce his warehouse stock. While he stocks approximately \$100,000 in parts, this amount would be more than doubled if standardizing were not watched closely. "We work closely with the architects in planning new schools so that only those standard items we have are used," he stressed.

#### Relations with Employees

Hurst believes that as nearly as possible men doing maintenance work should be on an hourly wage rather than an annual salary. "We make it a point to see all of our men while on the job at least twice a week," he said. "Either I or my assistant checks on the working habits of the men every day. By so doing it keeps them on their toes, as they never know when to expect us. We've found that we get a full day's work for a day's pay by this method and get away from the feeling which seems to slow up many workers when they get county or government jobs."

Asked what he considered an efficient maintenance organization, Hurst said: "No crew should be large

enough so it can answer calls on an emergency basis. We keep track of our men and if, for example, a refrigerator goes haywire we can get a refrigeration expert there in a minimum of time. But for the bulk of our maintenance the schools wait their turn. They will not wait long, but by adhering to this system we keep our crews busy all the time and still hold costs to a minimum."

The summer, of course, finds the regular crew increased from 150 to 350 men. "Our plumbers, for example, check every bit of equipment in each school during the summer and thus can replace worn parts before they give trouble," Hurst explained.

By having master plumbers, electricians and carpenters on his staff Hurst can do any job, even actually build a complete school. While most of the big jobs are contracted out, "we've got the men if we feel bids are too high," Hurst said. Hurst's maintenance crew includes roughly ten different categories of employees but he manages to do more than twenty different specialized jobs with them.

Hurst first joined the Dade school system in 1937 as a drafting instructor. He has a bachelor's degree from Central Missouri State College and his master's from Peabody College, Nashville, Tennessee. He served with the Navy during World War II, rejoining the system as supervisor of Tech High's Veteran's training program in 1945. He took his present post in 1947.



Concrete bicycle rack costs less and lasts longer than wooden rack.



Custodians in heating and ventilating class learn about new school equipment.

## IN-SERVICE TRAINING FOR CUSTODIANS

By E. B. SESSIONS

Director, School for Custodians, Bureau of Educational Research, College of Education,  
Ohio State University, Columbus



Dr. Sessions received his B.A. at Utah State Agriculture College, his M.A. at the University of Idaho, and his Ph.D. at Ohio State University. He was a superintendent of schools in cities in Idaho, an instructor at the University of Rochester and President of Carbon Junior College in Utah. Now he is Director of the School for Custodians and School Plant Consultant in the Bureau of Educational Research, College of Education, Ohio State University.

**I**NCREASES during the past ten years in the cost of new school buildings, the remodeling of old buildings, and the replacement of worn-out fixtures and equipment have caused boards of education and superintendents to reevaluate the work of the custodian in relation to the cost of school plant operation and maintenance. A growing emphasis placed upon health and safety in connection with the operation of the

schools has also caused the public to be more conscious of the problems of school plant maintenance and operation.

In the past when patrons thought of school costs, they did so largely in terms of salaries of teachers. Now the public is also thinking of other costs connected with the operation of the schools. In the matter of personnel, a rough estimate of the non-teaching employees of a school system shows that there is approximately one non-teaching employee for every two teachers. Administrative officials, principals, and supervisors are considered teachers; while custodians, business managers, clerks, nurses, bus drivers, and cafeteria workers, etc., are non-teaching employees.

### Custodians Forgotten?

Both on-the-job and pre-service training have received a great amount of attention during the

*Photos from Ohio State University Department of Photography.*

Panel discussions give custodians an opportunity to exchange ideas and experiences.

past decade or two. In business and industry employers have been willing to bear the expense of such training courses. In the educational field colleges, in addition to expanding their regular courses, have conducted short-term classes for administrators, principals, and supervisors, and have provided in-service training for teachers by means of workshops, evening extension schools, and demonstration centers. Comparable opportunities in general have not been available to non-teaching employees.

With the advent of new and often complex modern fixtures, equipment, and teaching aids, the work and responsibilities of the custodian are much different today from when his only duties were to keep the schoolhouse warm and reasonably clean. Included in this new school equipment are modern lighting fixtures, complicated heating plants, new types of flooring, movie projectors, radios, and in some cases, television. Since these new educational aids have become a part of the school plant and since education for health and safety has been brought into the school system, a custodial training program has become imperative. Boards of education need the best service possible from these employees if they are to guarantee an efficient and a long-time use of the school plant and its facilities.

There have been few if any standards of efficiency

established for school custodians. In general the custodian has been hired with little regard for his training or previous experience. His in-service education has been largely in terms of his own experience on the job. Custodial self-training through the trial and error method has been slow and costly. With all the new demands and new equipment a more efficient training program must be provided.

A study of the literature shows that there has been but little conscious effort on the part of boards of education to provide training for men and women who have chosen to be employed in school building maintenance. There have been, however, some in-service training programs developed by educational institutions in several states. New York, Indiana, Michigan, and Ohio are examples of states in which custodial training programs have been instituted during the past few years.

#### **Program Requires Full Support**

Any custodial training program, whether it be connected with the state department of education, colleges of education, or other state organizations, must have the support of superintendents and boards of education in the various districts as well as from state and local public school non-teaching employee associations. In most states custodial employees are not



organized as are teachers. In these states, a unified training program is much more difficult than where a sound and growing organization supports an in-service training program.

There are several types of custodial training practices. Some of these are fragmentary and inefficient. Others provide a comprehensive and efficient type of training which leads to the education of competent custodians. Successful in-service custodial training programs have two types of education as objectives. The first deals with the general work of the custodian, his public relations, his place in the educational program, and training for minor jobs which he is required to perform. These schools are usually held on college campuses and are attended by custodians from the entire state. The second, which should be included in any comprehensive training program, is a detailed and technical training course. Typical of such courses are heating and ventilating, housekeeping, electrical fixtures and equipment, including lighting fixtures, and care of floors. Of course, many more items could be added to both phases of the program, depending upon the time allotted and the relative importance of the various items.

#### **The Housing and Feeding of Custodians**

In many states where a unified custodial training program is not in operation, a statewide school or conference can be held with the specific purpose of creating interest in the training of persons employed in upkeep, maintenance, and repair of the school plant. In general, custodians feel that they are a forgotten group of school employees, and therefore at such conferences the housing, feeding, and entertainment of the group are of vital importance. If such a conference is not considered as important as a conference of school superintendents or a workshop for history teachers, custodians will continue to feel that they are neglected and an interest in in-service education will not be developed. The importance of this point cannot be overemphasized.

Enrollees attending a general conference for custodians are usually not acquainted with classroom procedures, textbook instruction, or examinations, and they are not accustomed to being held in class groups for long periods of time. Consequently, any meetings or classwork must be of short duration and of general interest.

At these conferences such topics as the following may be discussed: the custodian's place in the educational program; job analysis; the work schedule; relations with the teaching staff; minor problems which may include personal appearance, discipline, uniforms, responsibility after school hours, evening classes, athletic events, extra pay for extra work, the teacher's "handy-man," and unionization. These problems may seem unimportant to the superintendent and boards of education but they are of major importance to the custodian.

Equipment, furniture, and teaching aids might also

be discussed in the conference meetings. Among these items are: modernizing old seating equipment; motion picture equipment; radio repair work; lawns and shrubbery; and care of fluorescent lighting.

Some persons responsible for these general conferences have found it advantageous to acquaint custodians with new equipment, materials, supplies, furniture, and custodial tools. This can be done by asking the various commercial companies to have displays and by giving each representative an opportunity to discuss his product. If this type of education is handled efficiently, the conference director need not worry about the program becoming commercialized. Many commercial representatives are eager to discuss the value of the product and its use in school plant maintenance without giving a sales talk.

#### **Leaders Must Know Problems**

The selection of a discussion leader is most important. It is necessary to have a person with an intimate knowledge of custodial problems who can convey this knowledge to the group in simple, forceful language. Sometimes a school superintendent or business manager will be highly successful in this capacity. To lend dignity to the program, it may be advisable to engage men from out of the home state to be directly responsible for certain phases of the general training program. The custodian seldom has a chance to discuss his problems with others engaged in the same type of work, except in his own district. Custodians who most need the in-service training are likely to come from villages or small cities where they are afforded little opportunity to discuss these problems with persons whose experiences are greater than theirs. One of the greatest benefits of the conference type of in-service training is the opportunity given to exchange ideas and experiences. The programs must be planned accordingly. If the men are housed in one place and few if any evening sessions are held, the chance for the exchange of ideas and experiences is provided.

The district or state conference does not, because of number enrolled and the time element involved, give the intensive technical training required to produce efficient custodians. The area or school district specialized training school should be organized to give intensive and complete training in specific courses. The number to be enrolled should be limited and enough time allotted for thorough coverage of problems.

Three factors that will most likely contribute to the success of the specialized custodian training school are: the number of hours allotted to the course; the control of the number enrolled; and the qualifications and experience of the instructor.

#### **Class Efficiency in Time and Numbers**

Different subjects or problems will require varying lengths of time. For example, a course in heating and ventilating will require from 30 to 36 hours of intensive training, while a course in electrical fixtures and equipment probably can be concluded in twenty hours.



Classes can also be organized around other subjects such as care of sites, including athletic fields, good housekeeping, floor maintenance, safety and health. Various other subjects can be discussed, depending on the needs of the individual locality from which the enrollees come.

If men are to be given an opportunity to discuss their problems and the class discussion kept under control, the enrollment must not exceed 35, preferably 25.

In these intensive training courses each enrollee must be given an opportunity to discuss his individual problems and to receive help in the solution of these problems. Custodians, as with professional groups, have a strong desire to talk about their problems. This fact further emphasizes the necessity of employing as instructor a man who not only understands the custodian's problems in a particular field, but whose methods and personality will stimulate group discussions. The success or failure of the classwork depends largely upon the instructor.

#### **The Matter of Money**

Financing either the comprehensive type of school or the intensive training course seems to be the main reason for not providing more in-service training. If superintendents and boards of education are converted to the need for in-service training for custodians, means of financing such programs usually can be found. The general custodian conference, usually held once a year, may be financed by an enrollment fee paid by the individual district for each enrollee. If such schools are held on university campuses, the enrollees should be housed and obtain their meals on the campus. Because this training is definitely for the purpose of improving educational facilities in the various school districts, some states have made legal provisions whereby boards of education can pay all expenses incurred by the custodians attending such conferences. Usually the enrollee's regular salary continues, but in some cases the time spent at the conference is part of his vacation. The latter practice has nothing to commend it.

The cost of specialized district or area schools con-

sists mostly of the salary and expenses of the instructor. Enrollees usually live at home. If the board of education and superintendent are convinced of the value of such a training course, the board of education should pay the enrollment fees. The fee charged for a thirty-hour course in heating and ventilating, for example, should probably be between \$7.50 and \$10.00.

A successful specialized training course has been conducted in Ohio within the past few years. An expert instructor was employed to teach a thirty-hour course in heating and ventilating. These courses were organized in four different city school districts. Custodians from the cooperating school districts and from surrounding districts attended. Enrollees attended classes seven and one-half hours per week during alternate weeks for a period of two months for a total of thirty hours. If the length of time is extended over a two-month period, custodians do not feel that they are being imposed upon and therefore are eager to attend the classes. If classes are held every evening until thirty hours of instruction have been given, the men tire of the class and their general efficiency in regular work seems to decrease.

As far as the instructor's time is concerned, he may be employed full time for a two-month period provided four different centers are participating concurrently in the specialized training program.

#### **Both Programs Necessary**

Both types of programs are necessary for a complete picture of custodial in-service training. The general or state conference gives the custodian a feeling that he belongs to the educational fraternity. It provides training in public relations. It acquaints him with modern ways, means, and equipment, and gives him an understanding of the importance of his work. The second type of school, the specialized class, trains a custodian for specific phases.

Boards of education and superintendents, when educated to the problems of maintenance personnel, will be willing to pay the expenses of such schools and to insist that their employees attend. In a large measure the success of in-service programs depends upon a cooperative attitude from school administrators.

## PURCHASING PIANOS FOR THE BALTIMORE SCHOOLS

By SOL LEVIN

Specialist, Educational Equipment, Baltimore, Maryland, Department of Education

Mr. Levin, a native of Baltimore, received his B.S. and M.A. degrees at the University of Maryland. From 1937 until he enlisted in the Coast Guard he taught industrial arts and science in Baltimore high schools. In service he was an instructor in a radio school and also served as engineering officer on a troop ship. After the war he returned to teaching. In 1947 he was assigned to his present position in the Business Office of the Department of Education.



OF THE twenty thousand or so items—from kindergarten wood blocks to complex equipment of science laboratories—which are bought annually for Baltimore's 167-school system, the piano has always been among those few items whose purchase has consistently presented perplexing problems to our business office. From our correspondence with school systems of other large cities it appears that we have not been alone.

Besides the usual problems in purchasing most educational equipment—limitations in funds, rigid purchasing procedures established by law, etc.—buying pianos for school use presents additional unique difficulties which stem from the very nature of a musical instrument. The quality of a piano, like all other instruments, is judged by musicians on an indefinable abstraction known as "tone." On this basis pianos are compared, evaluated and preferences established by pianists. That there is no agreement or defined standard among musicians as to which piano has the best "tone," which next best, and so on, is indicated by the fact that each concert pianist insists upon using his own favorite make or model of piano. The problem of purchasing school pianos therefore resolves itself

into not one of merely buying an item of furniture which by its contour can be identified as a piano, but instead purchasing an instrument having a particularly "desirable tone," which can be unmistakably and unquestionably identified by everyone as being particularly suited for public school instruction.

There seem to be two basic approaches to the problem of purchasing pianos for schools, employed with individual modifications and with varying degrees of success by most school systems.

### First Method

The "Free-Hand Method" is one in which some official in the school system, usually the director of music, is allotted a certain amount of funds and is given free rein to purchase pianos that he thinks are best suited for school use. Superficially this appears to be an ideal arrangement. It is ideal, however, only under conditions where unlimited funds are available and where the music director can afford to purchase in the Steinway class. Here he cannot go astray—he will purchase unquestionable quality, and his judgment in this respect cannot be criticized.

But, as is usually the case in public school purchasing, where funds are limited and where Steinways are not quite a requisite for the accompaniment of elementary school soloists, the purchaser employing the Free-Hand Method finds himself in a quandary. It then becomes his responsibility to select, from possibly ten makes of pianos in the middle- and low-price field, the one he thinks best for school purposes.

An individual purchasing a piano for his personal use in the home will select the piano with the tone he likes best, being influenced to a certain extent by

the salesman, the appearance of the piano, and the price tag. Certainly under these circumstances the position of the piano purchaser who is spending public funds is not an enviable one, especially with the piano industry as highly competitive as it is. If anyone wished to question his selection, particularly if the piano chosen was slightly more expensive than others submitted for consideration, the purchaser would find it very difficult to justify his choice, unless he had an unusual background in piano construction and design and an extraordinary reputation for honesty.

#### Second Method

The second and more universally adopted method of purchasing school pianos employs specifications as a basis for the purchase. The "Specification Method" has several variations, differing with locality and established purchasing procedure.

The use of a *good, detailed specification, prepared fairly and based solely on objective data relative to the materials and workmanship that go into a piano* is the most acceptable basis for the purchase of school pianos. If the specification is inadequate or unfair, it defeats the purpose for which it was prepared, namely: providing a means for acquiring a good piano at the best price and under fair competition.

How does one go about preparing good specifications? This was the question the business office staff of the Baltimore Department of Education asked themselves when Music Director Kenneth Hjelmervik made it known that he had allocated \$55,000 of the music division's share of Baltimore's recently voted \$3 million school equipment loans for some 100 upright pianos. Pianos earmarked for replacement had been exposed on the average to more than 25 years of service in the classroom. To grasp the full significance of the condition of these pianos, one should realize that the piano industry considers that one year of classroom usage ages a piano as much as five years home usage.

Dr. Hjelmervik and the author canvassed music directors of a number of large school systems. Letters were received from New York, Philadelphia, Washington, Indianapolis, San Francisco, Los Angeles, New Orleans, Cleveland, and many others. In only a few instances did the responses include detailed specifications. In most cases the answers were disheartening, offering sympathy but stating flatly that they had no recent specifications, and that if they had to, they would not know how to go about preparing them. Others merely recommended certain pianos and cautioned against specific ones as being undesirable. The following quotations from letters received exemplify the general vein of opinion among those responsible for purchasing school pianos:

"We do set up specifications, and we do accept the low bid if it meets the specifications . . . but we do not accept pianos unless we are satisfied with them in matters of action and quality of tone." In this situation, whereas specifications are prepared and bids received, the music director still has a "free-hand" to

purchase as he sees fit. This procedure may obtain the desired end, but it is our opinion that it is not the one that will be most conducive to the fostering of good bidder relationships.

"Our custom is to purchase studio uprights of a standard make for classroom purposes. Procuring standard makes of recognized quality eliminates the need for specifications." Here we question what is meant by a "standard make of recognized quality," and how would a choice be made between the numerous pianos that could come under this category?

"Frankly I would not know how to go about setting up specifications for piano purchases."

"We get around specifications by indicating that our bids are to be on a certain piano or equal. Then the purchasing department throws all the responsibility on our department to say what is the equal. So far, the piano dealers of this city have always accepted my judgment without any seeming resentment." This person is indeed in a fortunate situation.

"It is very difficult to draw up a specification which is not met by several pianos of varying degrees of excellence. This year we were forced to accept a piano that in our judgment was very much below the standard we had in mind because of a very few dollars' difference in price. On future purchases of pianos we expect to include in the specifications a statement that the piano must be satisfactory in tone quality and touch to the committee appointed by the board to pass upon pianos and make recommendations. I know of no other way to protect the boys and girls in the schools so long as the acceptance of low bid is in effect."

The greatest shortcoming of the specifications was that they abounded with very unspecific and indeterminate generalities, such as: "All chippings and tunings shall be done in a good workmanlike manner." "Keys shall be covered with a good quality ivory." "Pianos shall be covered with heavy ivorine." "Plate shall be of best quality, substantially constructed," and so on. Such adjectives as "good," "reliable," "recognized," "heavy," "best," etc., certainly open the specifications to a wide range of individual interpretations by the bidder, and his interpretation cannot be readily refuted.

Using the "tone approach" in the purchase of school pianos was found to be a fallacy. How can anyone set himself up as the final judge of comparative values of tone, when tone preference is so often a matter of personal taste? What individual is so gifted as to be able to state dogmatically that the tone of this piano makes it worth \$10 or \$600 more than that one?

Of course it is within the realm of conception that the time will come when tone will be scientifically determined, measured and defined. Some of the larger piano manufacturers, by the use of the oscilloscope and other electronic devices, are trying to analyze the desirable as well as the unpleasant components of tone and to determine their sources in the piano. Then, by



introducing modifications in scale design, they are attempting to inject richer and more brilliant tones into their instruments.

#### Engineer's Viewpoint

We became convinced that the solution to the problem of preparing specifications, fair to all concerned, could be found more likely by approaching it from an engineer's objective point of view rather than from that of the musician. A musician selects a piano because its sound is appealing and pleasant to him; the feel of the keys, their response to his touch are very satisfying; he does not know or care why—he knows the experience is satisfying. On the other hand, if an engineer who is not a musician were asked to select the best piano, he would do so only after taking it apart and finding it well constructed with lumber and other materials that have been carefully selected for their quality.

From all this we came to three conclusions: first, that the specifications we received from other school systems were either inadequately prepared or unsuitable for use under our established purchasing procedure, or both; second, that we would have to start from scratch and prepare our own specifications; and finally, that before we could justifiably undertake the task, we would have to acquire a more complete technical background of the materials and techniques employed in good modern piano construction.

We began by trying to analyze what we had learned of general practices elsewhere. Our first major concern was the type of piano that we should purchase. This decision had to be based solely on the job that was expected of pianos in our school system. We knew that they were to be used in elementary and junior high school assemblies and activities. We knew also that they would have to serve for a long time.

To meet these requirements the piano must be soundly constructed of the best available materials; it must be specifically built for school use. Secondly, the piano purchased should have acceptable tonal qualities. On the other hand the piano need not have elaborate casework and other fineries that would be considered luxuries. These became the cardinal principles around which all subsequent activities pertaining to the purchase of pianos were based.

#### Piano Industry Helpful

Now that we knew what we wanted, our next problem was to acquire the technical knowledge that would enable us not only to specify details of construction and exact quality of materials but to determine objectively whether our specifications had been adhered to in the pianos finally delivered.

We knew that the piano industry itself would have to be our principal source of information. We immediately sent a form letter to every piano manufacturer in the country in which we said, first of all, that we were in the market for 100 school pianos. We

then described briefly the problem that confronted us relative to the preparation of specifications "which would assure our obtaining instruments of good quality and suitable for school use." The letter then stated: "We are inquiring as to the possibility of consulting with your experts, either in Baltimore or at your factory; or if this is not practical, of the possibility of our examining the detailed factory specifications and drawings of the pianos which you would recommend for our purpose."

As expected the office was deluged with letters, literature, phone calls and salesmen. It was not until later that we learned in visits to the factories, and in talking with executives of the companies, that the letter was timed perfectly to coincide with the first post-war slump in the piano industry, and that an order for such a quantity of pianos would be welcomed and fought for by all.

We also soon discovered that the piano industry is particularly interested in school business for its advertising value, and is hence willing to sell its products to schools practically at cost. They are quite aware that thousands of children will see the piano's name on the fallboard, but above all, the mere use of a particular piano by the school is the highest possible indorsement to the child and future pianist.

The response from the industry was on the whole very encouraging. We received numerous invitations to visit factories and to consult with their technicians and engineers either at the factory or in Baltimore. Some sent detailed specifications and drawings that were most helpful, while most sent elaborately printed advertising pamphlets and booklets that were interesting, but of little value for our purpose. We found that one of the most difficult jobs in our undertaking was to divorce the "sales talk" from factual and significant data.

From the responses obtained we tentatively decided that the following course of action would be required before we could prepare our specifications: make personal visits to each of the local piano dealers who would bid on our contract; make inspection visits to one or more piano factories; request that each factory interested send a technician (not a salesman) to consult with us and give us detailed information concerning his piano; request samples and more data from manufacturers of piano parts—felt, wire, bushing cloth, actions, and others.

Our visit to the seven local piano dealers accomplished more than we had hoped. Besides having the opportunity to see and try various pianos on which we knew bids would be submitted, the development of a wholesome personal relationship proved invaluable as our work progressed. We felt that each dealer, after discussing the matter with us, understood our problem and was convinced of the sincerity and honesty of our approach. We in turn came away assured of receiving every cooperation possible to assist us in our undertaking. It was as a result of this relationship that the dealers were willing to send

samples to us without obligation for examination and testing as we saw fit several weeks before our specifications were made public.

#### Visits to Factories

The most important phase of our study was in visits to factories, for only at its source would we be able to see materials that go into a piano and techniques employed in its manufacture. Above all, however, we were looking forward to the opportunity of meeting the men who designed the piano and engineered its construction—men who would be able to answer our numerous questions and help dispel some of the mystery which surrounds the processes and techniques employed in the manufacture of better pianos.

For this purpose we selected two factories as "musts," with several others as possibilities. First was the Steinway factory because of its reputation in the industry and mainly because the prices of their instruments made them prohibitive to us and non-competitive among those interested in bidding on the contract. Second was the Pratt-Read Company which does not make complete pianos, but manufactures the action that many quality piano-makers use. The piano action mechanism has always been one of the major enigmas in preparing specifications.

At the Steinway factory, not only did we see pianos being made from the lumber stockpile to the final finishing and regulating room, but we had the opportunity to question experts in the field of piano design and construction. We left the factory with pages of written notes as well as printed matter including detailed specifications of construction, data on materials used, and a variety of other pertinent information.

At the Pratt-Read factory we witnessed construction of the intricate mechanism of the piano action. The engineers with whom we talked were very much interested in our problem and were most anxious to assist us. They explained in detail, with the use of models, the differences between the regular full-length action and the condensed action. We discussed the results of their experimentation with plastic parts, the difference in quality of bushing cloth and its importance, plastic versus ivory key covering, various grades and thicknesses of plastic and ivory used, and the like.

What impressed us most on our visits was the eagerness of the people at the factories to help us, as was evident in the personal interest taken in us and in our problems.

We requested local piano dealers to let us examine their pianos with the help of their respective factory men—with men who built and designed them. Within a few days there were ten pianos assembled in the auditorium of our administration building.

A checklist was prepared to serve as a guide for compiling information pertaining to each of the pianos. The data entered on each checklist were to include that compiled from our inspection, from information furnished by factory men, and from specifications that were sent by manufacturers.

#### CHECKLIST OF PIANO DATA

Name of Company \_\_\_\_\_

Local Dealer \_\_\_\_\_

Factory Representative \_\_\_\_\_

#### CASE

##### Overall Dimensions

1. Height (without casters)
2. Width
3. Depth
4. General case design (plain, ornate, etc.)

##### Back

1. Number of posts
2. Cross-section area of posts
3. Material of posts and selection of lumber
4. Manner of joining of posts to case (top and bottom)
5. General Construction

##### Side Panels

1. Overall thickness
2. Width and thickness of core stock pieces
3. Number of plies and thickness of plies
4. General construction and method of joining

##### Front, Upper and Lower Panels

1. Dimensions and general construction
2. Manner of fastening and ease of removal

##### Music Desk

1. Description (ability to hold sheet music)
2. Strength of construction

##### Fall Board

1. Description of folding or sliding mechanism
2. General construction and strength

##### Top Lid

1. Thickness
2. Lifting and holding mechanism
3. How fastened?

##### Legs

1. Dimensions
2. How joined to case?
3. Bracing (dimensions)
4. Knee-space

##### Casters

1. Dimensions
2. Single or Double
3. Ball Bearing?
4. Tires?

Openings in case permitting entry or insertion of foreign objects

##### Finish

1. Mar resistance (scratch test)
2. Materials used (coats)
3. How applied?
4. Appearance (finish and matching of veneers)

*Hardware*

1. Materials
2. Platings, if any

*Miscellaneous (special features)***ACTION, KEYS, HAMMERS AND PEDALS***Name of Action**Type of Action* (direct blow, full size, drop, compact)*Quality of Action Materials*

1. Wood Parts (clear? quarter sawn? maple? etc.)
2. Is plastic used? In which parts?
3. Action felts (make? quality? mothproofed?)
4. Bushing cloth (make? quality?)
5. Woven felt punchings (quality? manufacturer?)

*Hammers*

1. Weight
2. Name of manufacturer of felt
3. Quality of felt
4. Mothproofed?
5. Reinforced?
6. Stapled? (How far down the scale?)
7. Length of Shank

*Keys*

1. Manufactured by what company?
2. Type of wood used in white keys
3. Material used to cover white keys
4. Thickness of white plastic or ivory
5. Material used for sharps

*Pedals*

1. Number of pedals
2. Of what made?
3. Function of left pedal
4. Function of right pedal
5. Function of center pedal (if included)

**REGULATION***Rough Regulation*

1. At which point in manufacture was it received?
2. How many? Intervals?

*Fine Regulation*

1. When received in manufacture?
2. How many? Intervals?

*Key Regulation*

1. Are keys perfectly level across key bed?
2. Average weight of touch (Is it uniform?)
3. Average depth of touch (Is it uniform?)
4. Height of black keys remaining above white keys when the former are depressed

*Hammer Regulation*

1. Do hammers strike the strings squarely?
2. Do any of the hammers rub against adjacent hammers in their motion?
3. Do the spaces between the hammers present a straight and even appearance?
4. Position of strings in relation to hammer felt

when the hammer strikes the treble strings (center, right or left of center?)

5. Position of strings in relation to hammer felt when the hammer strikes the bass strings (center, right or left of center?)

6. Average measurement of let-off point (Is it uniform?)

*Damper and Back Check Regulation*

1. Do dampers hit the strings squarely?
2. Does the top of damper strike the string before the bottom of the damper?
3. When does the damper begin its movement away from the strings, in relation to the hammer's position?
4. Are the back checks straight and in square?
5. Does each butt check land squarely in the middle of each back check?

**SCALE CONSTRUCTION***Soundboard*

1. Material (selection of lumber)
2. Grade
3. Annual ring lines per inch
4. Moisture content when placed in piano?
5. How formed and placed in piano?
6. Type of glue used
7. Number of ribs
8. Material of ribs
9. Are ribs recessed into lining?

*Plate*

1. Material
2. Full height?
3. How fastened to back?
4. How finished (number of coats of bronze and baked-on Japan)?

*Bridges*

1. Materials and construction of treble bridge
2. Material and construction of bass bridge
3. How is treble bridge reinforced? (number of screws and dowels)
4. How is bass bridge reinforced? (number of screws and dowels)
5. Are maple buttons used with screws?

*Wrestplank and Tuning Pins*

1. Number and thickness of plies
2. Are the plies sawn or rotary cut?
3. Material (type of wood and glue)
4. Size of tuning pins
5. Are tuning pins blued or otherwise coated?
6. Are tuning pins bushed?

*Strings*

1. Name of manufacturer of music wire
2. Grade of music wire
3. Are the bass strings wound with solid copper?

*Tunings*

1. Number of chippings received in process of manu-



facture (at what intervals?)

2. Number of tunings received (at what intervals?)
3. Has piano been voiced? (describe)

### TONE

#### Check One

1. Superior
2. Acceptable
3. Unacceptable

Is sample piano in tune?

### SPECIAL FEATURES

#### List

After all the information was compiled, the next phase of our work included evaluation of the data in terms of the criteria originally established as the basis for the selection of desirable school pianos. We would not compromise on quality of materials; in this we would specify the highest grade that we could of lumber, veneers, plastics, hardware, lacquer, felts, bushing cloth, piano wire, etc. Also, the method of construction and workmanship employed insofar as we could determine would have to be in accordance with the best standards of the industry. Finally, we proceeded on the assumption that if the material and workmanship were of the high quality which we would specify, the tone would more than likely be acceptable.

The first draft of specifications was that of a possible model school piano. This had to be modified in accordance with the amount of alteration we knew the various piano manufacturers would be able to make in their stock piano without having to redesign it completely.

When the specifications were finally advertised, bids were received on the following school pianos: Everett, Gulbrandsen, Hamilton, Janssen, Kimball, Krakauer, Steinway, Storey and Clark, Weaver, and Wurlitzer. Award was made to the lowest bidder who bid on his regular school piano, but with alterations as required to comply with our specifications.

Since the specifications were first completed, we have already received additional data that will be incorporated in future revised versions. We are aware, for example, that further examination is needed on our part in such matters as glue and gluing techniques in various parts of the piano, hammer felts, voicing of hammers, pin block and bridge construction, etc. We have made some progress toward solving the problem of how to purchase a good school piano, but considerable investigation and study remain to be done.

Only if school officials know what constitutes a good school piano and insist that certain standards of quality be maintained in the construction of those which they are to purchase will the industry as a whole be challenged to raise its standards.

Following are the specifications for a school upright piano as they were submitted to the bidders:

#### Specifications for School Upright Pianos

**Standard of Quality:** The Department of Education desires to purchase pianos that will best serve the intended purpose. Future rigorous use and length of service make it necessary for the pianos to be exceptionally well constructed of high quality materials. They must have the proper tonal qualities of volume and brilliance necessary for effective use in instrumental and vocal instruction. With this in mind and after considerable study, consultation with nationally recognized authorities, and visits to factories, the specifications contained herein were prepared.

The Department of Education will therefore examine with close scrutiny every sample submitted as well as every piano delivered by the successful contractor to see that these qualities have been complied with to the letter of the specifications.

**Inspection of manufacture:** The Department of Education reserves the right to have an inspector on the premises of the factory during any or all of the stages of the manufacture of the piano and its parts.

**Samples** shall be submitted which will be examined carefully by officials of the Department of Education for details of design and construction, quality of workmanship and materials, tone, regulation, etc., to determine their adherence to specifications. If a standard stock piano is submitted as a sample which deviates from the specifications in any respect, the bidder shall specifically state in a letter accompanying his bid that he is aware of these deviations (which he shall itemize in detail), and shall further state how the delivered pianos which he intends to furnish shall comply with the specifications. If the bidder fails to submit the above required data with his bid, his sample shall be judged accordingly; i.e., at its face value, and if it does not conform to the specifications in the opinion of the Department of Education it shall be rejected.

**Delivery and tunings after delivery:** Pianos shall be delivered to the room designated by the principal of each school, set up, ready for use. Each piano shall be tuned and completely regulated within a month after delivery. Each piano shall be further tuned and completely regulated during the sixth month after the first tuning and then finally tuned and completely regulated during the twelfth month after delivery, or at any such time during the first year after delivery as the Director of Music may require.

**Guarantee:** The pianos shall be guaranteed unconditionally for not less than five years by the contractor against defective materials and poor workmanship.

**Affidavit and Supporting Data Required:** The Department of Education reserves the right to require the contractor to furnish upon demand an affidavit along with supporting data to prove his compliance with any or all of the specifications.

#### Case Specifications

**Selection and seasoning of lumber:** All lumber used in the construction of the pianos shall be clear and

sound, free from knots, rot fungus, pitch pockets, mineral streaks and any other imperfections affecting the strength and appearance of the wood.

All wood of the case and back shall have been air-seasoned not less than six months to a 30 per cent moisture content and then kiln dried to a final moisture content not to exceed 5 per cent. After drying the lumber shall be allowed to temper in controlled atmosphere at least two weeks before being milled.

*Design and construction:* The case shall be of plain-line design, well constructed according to the highest standards of the industry. The overall height of the pianos (including 2-inch casters) shall not be under 44 inches.

The case shall be of five-ply construction consisting of not less than 11/16 of an inch thick poplar core stock, built up of glued strips not more than 2½ inches wide. The core stock shall be both cross-banded and faced with selected 1/20 of an inch maple veneering. Face veneers shall be matched for color and grain and shall be free from mineral streaks and other imperfections. The plywood shall be hot bonded with urea resin glue.

All solid wood parts of the case shall be made of select hard maple (*acer saccharum*) to match the veneer of the case in color and grain.

The back shall be supported by not less than five posts of high grade 1" or 2" lumber, of not less than 40 square inches of total cross sectional area. The top of the back (including the post ends, pin block, filler blocks and back covering) shall be finished with three coats of clear lacquer (as specified under Finish) and left uncovered.

The fall board may be either the slide- or fold-back type. If the slide-back type of mechanism is used it shall consist of a round rod pivoting on two individual pivots, one connected at each side of the case.

The lid shall be hinged at the back and screwed down to the case in the front with flat head brass screws through brass bushings.

The pianos shall be equipped with 2-inch diameter double-wheeled, hard rubber, ball-bearing casters, Darnell or equal.

The case shall be completely closed, so that foreign matter cannot readily enter or be inserted into the case from the outside.

*Finish:* The pianos shall be finished in accordance with the highest standards of the industry, both in materials and workmanship employed.

Upright pianos shall be finished so as to retain the natural color of maple. *Color blocks will be furnished to the successful bidder to show allowable limits of color.*

The finish to be applied to the case shall consist of three coats of the highest grade clear gloss lacquer (O'Neil Duro #32231 or equal) in the consistency of 27 per cent solids at the time of each application, applied as follows:

The first coat, which shall be a gloss lacquer, shall be sprayed in a manner to cover all surfaces, including

the inside and back of the case.

This coat shall be allowed to dry in a dust-free atmosphere for at least three hours and then sanded lightly with 4/0 finishing paper.

The second coat, which shall also be a gloss lacquer, shall then be applied to all case surfaces, inside and outside. This coat shall be allowed to dry in a dust-free atmosphere for at least three hours. The outside surfaces only then shall be sanded lightly with #00 steel wool.

The third coat shall be a gloss lacquer which shall be allowed to dry for at least three hours and then hand rubbed and waxed to a dull, satin finish.

Care should be exercised in the application of all coatings to insure adequate and uniform depth of finish, of strong mar-resistant qualities and providing a protective and smooth finish.

No bleaches shall be employed on any of the items of this contract without express permission from the Department of Education.

#### Action, Keys and Hammers

*Action Construction:* The action shall be of the direct blow type, full upright size. Drop actions or compact actions shall not be employed. The actions shall be made of selected, clear, sound quarter-sawn rock maple, free from any imperfections.

All action felts (including damper felt, bushing cloth, etc.) shall be made of 100 per cent wool (to Federal Trade Commission's Wool Products Labeling Act) and shall be mothproofed. They shall be American Felt Company action felt and Charles W. House and Company woven felt punchings and bushing cloths, or approved equal. The actions shall be one of the following: Pratt-Read, Thayer, Kimball, Baldwin, Steinway or Aeolian-American.

*Hammers* shall be of not less than 12-pound, 100 per cent wool felt, mothproofed; shall be American Felt Company's highest grade hammer felt, or approved equal. The first bass hammer shall be stamped with the name of the felt manufacturer and the weight of hammer used. Hammer felts of the bass and middle treble shall be stapled or wire stitched.

*Keys:* White keys shall be made of either basswood and/or sugar pine, covered with celluloid (plastic) of not less than .052 of an inch finished thickness. Sharps shall be made of a molded plastic. Front rail punchings shall be of the finest quality, Charles House punchings or equal.

*Action Regulation:* In the process of manufacture, the pianos shall receive a minimum of one rough and one fine regulation not less than three weeks apart.

The pianos shall be delivered to the schools in a well regulated condition:

*Keys* shall lie perfectly level across the keyboard. The weight of touch shall be uniform, 2 ounces (57 gms) over the entire keyboard. Depth of touch for white keys shall be either 3/8 or 7/16 of an inch; whichever depth is used, it shall be identical for all keys. The top surface of the sharps, when the sharps are de-

pressed, shall not go lower than  $1/32$  of an inch above the white keys when the white keys are not depressed. The depth of touch of all sharps shall also be uniform.

*Hammers* shall strike the string (or strings) squarely and shall travel to and from the strings without touching adjacent hammers. The space between all hammers shall present a straight and even appearance.

Hammers in the treble section shall strike the strings so that the strings which are struck are in the center of the hammer felt at the striking point. Bass hammers shall fit so that when they strike the strings, the treble edge of the hammer felt extends slightly beyond the treble edge of the string at the striking point of the felt. The let-off point for each hammer shall occur when its striking surface is from  $1/8$  to  $3/16$  of an inch from the strings.

*Dampers and Back Checks:* Dampers shall hit the strings squarely, except that the top of each damper shall hit the string slightly before the bottom of the damper. The damper shall begin its movement away from the strings when the hammer has moved approximately half its stroke. Each back check shall be straight up and down and in square and spaced evenly so that each butt check lands squarely and in the middle of each back check.

*Pedals:* Pianos shall have three pedals, including a bass sustaining pedal. The pedals shall be solid cast brass.

*Hardware:* All external hardware shall be of solid brass.

#### Scale Construction

*Soundboard:* The soundboard shall be made of the finest quality, selected, quarter-sawn, mountain-grown spruce (Eastern spruce preferred) North Hudson Woodcraft Corporation "Select" or equal. The soundboard shall be close-grained with not less than eight annual rings to the inch at any point. Annual ring lines shall run as nearly straight and parallel to each other as possible across the entire soundboard, with a tolerance of deviation not exceeding 1 in 20 from the parallel to a line drawn diagonally across the board. No bleaches or any coloring matter shall be applied to the soundboard.

The lumber used in the soundboard shall have been air-seasoned for not less than six months to a moisture content under 30 per cent and then kiln dried to a moisture content of not more than 4 per cent. The soundboard shall be glued with waterproof resin glue and then allowed to season further in a dry kiln for not less than twelve days before fitting same into back of the piano.

The soundboard shall be reinforced with not less than nine nor more than twelve quarter-sawn ribs (spruce or sugar pine), which are recessed at their ends into the lining.

*Plate:* The plate shall be of cast iron, full case height, completely and thoroughly bronzed or finished in baked-on Japan and bronze.

*Bridges:* The treble bridge shall be made of quarter-sawn select rock maple which has been seasoned at least six months after having been made into plate form. The bass bridge shall be made of rock maple, of which at least the top piece is quarter-sawn. Both treble and bass bridges shall be glued to the soundboard and reinforced with flat head wood screws which shall be driven through maple buttons, as follows: The bass bridge shall be reinforced with not less than three screws (or two screws and a dowel) and the treble bridge shall be fastened by not less than six screws (or two screws and at least eight dowels)—Steinway excepted.

*Wrestplank* shall be made of not less than four-ply, selected, highest grade, cross-laminated, *sawn* (not rotary cut) hard rock maple, glued with water resistant urea resin glue, and allowed to season at least four months after gluing before installation into the piano. Tuning pin holes shall be bushed with rock maple bushings (Steinway excepted).

*Strings:* Treble strings and the core of the bass strings shall be made of the highest grade music wire, American Steel and Wire Company "Perfect" or approved equal. Bass strings shall be wound with solid copper wire.

*Tunings during the process of manufacture:* Each piano shall receive a minimum of two chippings (not less than 24 hours apart) and 4 tunings. There shall be a minimum of three days between each tuning.



# PURCHASING SCHOOL BUSES

By ROBERT L. HOPPER

Director of Research  
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**T**HE TRANSPORTATION of children to and from schools has become an integral part of almost every school's program. Today, traveling distances to school pose no problem. Rural children may have as good educational opportunities as city children. Indeed, school bus transportation may go down as one of the helpmates in fostering decentralization of living areas and reorganization of school districts.

Every school day six million children are transported in more than 90,000 school buses. Over \$150 million is expended annually for this service, and further increase may be expected as more small inadequate schools are consolidated into larger schools.

## School Buses Purchased in 1948-49

An increasing number of school districts are purchasing and operating their own school buses. Methods employed in assuming this responsibility vary widely. THE AMERICAN SCHOOL AND UNIVERSITY enlisted the cooperation of the 48 state departments of education in compiling statistical data on the amount and kind of public ownership of school transportation.

During the 1948-49 school year 16,368 new school buses were purchased. Of this number 67 per cent were purchased for replacement of obsolete units; 15 per cent, or 2,455 buses, for the increased number of children to be transported. Consolidation of school districts accounted for the purchase of 1,964 school buses or 12 per cent of the total. The increase of publicly owned buses was evidenced by the purchase of 982 vehicles, 6 per cent of the total purchased.

These 16,368 buses cost the school districts ap-

proximately \$74 million plus state and federal taxes and cost of delivery. When the salaries of drivers and the costs of operation and maintenance are added, it can be appreciated that school transportation is an expensive enterprise.

## Time of Year Buses Are Purchased

School buses are most often purchased during the months of June, July and August. The summer period has become accepted for the purchase of buses since at this time budgets have been approved and preparations made for the next school year. Only five states purchase more than 30 per cent of the buses at other times of the year.

What effect does the purchasing of buses during a three-month period have upon their manufacture? A planned purchasing schedule is costly to school systems and manufacturers alike. School bus manufacturers have difficulty in anticipating the demands of school systems. If year around production schedule is maintained by the manufacturer, many buses must be stored until the three-month purchasing period rolls around. If a year around production schedule is not maintained, regular employees of manufacturers must be supplemented with seasonal workers, all working overtime. Storage, overtime pay, less experienced personnel, and inefficiency mean valuable dollars spent needlessly.

## Delivery of Buses

Delivery as well as the purchase of school buses should be conducted on an annual schedule. At present most school buses also are delivered during the months of July, August, and September. Four states

receive about 30 per cent of their new buses during other months.

Is it possible and practical to plan for delivery of buses throughout the calendar year? Since 67 per cent of school buses purchased are for replacement purposes, many of these replacements could occur at any time during the year. School buses to provide increased transportation are purchased and delivered throughout the year. As new consolidated districts are formed, and school ownership of buses becomes accepted policy, it is entirely possible to schedule the purchase and delivery of new buses over a period of months. Only in a few cases is it absolutely essential that buses be purchased during the summer months and delivery made immediately preceding the opening of schools.

#### Who Selects School Buses

Selection of school buses is traditionally a responsibility of the local school board and superintendent. In recent years some state departments of education have had a tendency to assist in the purchasing process. Through the purchase of a year's supply of buses on state specifications, material savings have been noted in several states.

Despite the trend, the local school board and superintendent select the school buses to be purchased. In 44 states final selection is made by the local school district, usually with state specifications or standards as a guide. (One specification which has been accepted in all states except Michigan, is that the predominant color of the bus shall be yellow.)

In two states, the selection of school buses is a joint responsibility of the state department of education and the local school district. In Delaware and North Carolina the selection is the sole responsibility of the state department of education.

Much more attention is now devoted to proper selection. Size, durability, maintenance, operation, and comfort are factors which receive increasing attention in the selection process.

#### Complete Bus vs. Chassis and Body Separately

Most buses may be purchased in two separate units, a chassis and a body. When a school district purchases a bus, three factors, quality, price, and service,

are probably foremost in determining the specific unit. Within this framework bids are requested and the best school bus selected. Bids are requested for complete school buses in 26 states. In fourteen states bids are usually secured separately for chassis and body.

In the remaining eight states the purchase of school buses is entirely a local matter. The local board of education in each school system determines the form in which bids will be secured and buses purchased.

If the school bus is purchased as two separate units, it is accepted that the chassis dealer has one product to sell, and the body dealer quite a different product. Some districts feel that tax dollars can be saved by making separate purchase contracts for each unit. Recently the Oklahoma legislature enacted a law which requires separate bids for chassis and body. However, in a majority of the states the purchase is usually of the complete unit.

#### Summary and Conclusions

The purchase of school buses is predominately a local problem. In some states the legislature and state department of education are becoming increasingly interested in the purchase of school buses in order to insure safety and economy. Through a continuing examination of practices communities can assure themselves of the best quality and greatest economy in school buses. The objectives of purchase should determine the procedure. Fixed regulation and legal requirements may prove unsatisfactory without constant review.

States need to develop a planned purchase and delivery program. Both school districts and manufacturers have much to gain through a cooperative schedule program. Action should be in light of needs and the use to be made of new school buses.

Even though the transportation of children is now an integral part of the school program, it should not dominate the program by taking too great a share of the school dollar. Transportation is an aid to good teaching, a means to an end. Every care should be exercised in purchasing buses to secure vehicles of high quality at the best possible prices. Good selection and purchasing practices are important in achieving this end.

# AMERICAN CITY BUREAU

(ESTABLISHED 1913)

221 N. LaSalle Street, Chicago 1, Illinois

1010 Equitable Building  
Portland 4, Oregon

470 Fourth Avenue  
New York 16, N. Y.

(Charter Member American Association of Fund-Raising Counsel)

---

THE EXPERIENCE OF 37 YEARS

THE RECORD OF 2800 FUND-RAISING CAMPAIGNS

THE COMPETENCE OF A CAREFULLY RECRUITED,  
PERMANENTLY EMPLOYED STAFF

THE SUPERVISION OF THREE CONVENIENTLY  
LOCATED OFFICES

THE ETHICS OF THE AMERICAN ASSOCIATION  
OF FUND-RAISING COUNSEL

THESE PROFESSIONAL AND  
BUSINESS ATTRIBUTES CAN  
BE OF VALUE TO YOUR PLANS  
AND PROGRAM

*Consultation—without obligation—is invited*

On April 22, 1950 — our thirty-seventh anniversary of continuous operation — the BUREAU was working with 33 organizations in fields of education and health and public welfare.



# **BUILDING PRODUCTS AND SERVICES**

**Structural Systems**  
**Standard Buildings**  
**Steel Building Products**  
**Metal Trim**  
**Roofing**  
**Glass Block**  
**Windows**  
**Venetian Blinds**  
**Doors**  
**Bronze Tablets**  
**Structural Tile**  
**Flooring**  
**Stair Treads**  
**Waterproofing**  
**Wardrobes**  
**Chalkboards**  
**Acoustical Materials**  
**Heating and Ventilation**  
**Incinerators**  
**Plumbing**  
**Lighting**  
**Electrical Equipment**  
**Window Shades**



# AUSTRAL

**WINDOW  
HARDWARE . . . . .**

**SEC.  
1**

**STRAIGHT 8 . . . . .  
WARDROBES**

**SEC.  
2**

**MULTI-USE  
BLACKBOARD FIXTURE**

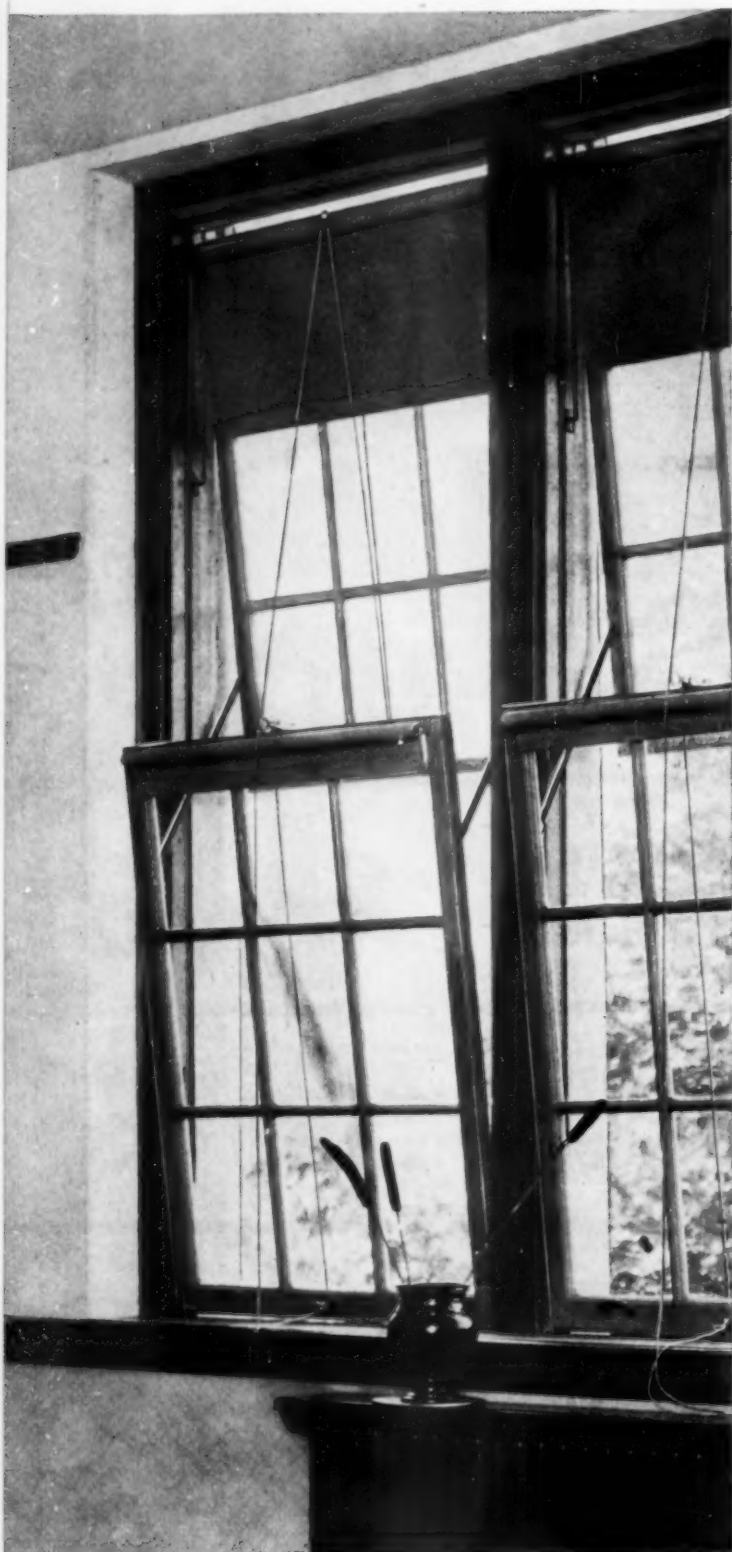
**SEC.  
3**

**TRULOCK  
SAFETY SCREEN**

**AUSTRAL SALES CORP.**  
101 Park Avenue, New York 17, N. Y.



# AUSTRAL WINDOWS - With simple balance arm



Austral balance arms in position shown above afford large opening at meeting rail, directing incoming air up and towards center of room. Small opening at top allowing vitiated air to escape, while lower sash is still in contact with sill.

Shades attached to and held firmly against the sash at all times insures absolute control of light without interfering with incoming air.

2

## *Basic Principles*

1. CONTROLLED CIRCULATION of Air Without Direct Drafts
2. BETTER CONTROL of LIGHT with Shades attached to Sash

### FEATURES

The Austral Window is primarily a schoolhouse window by reason of the excellent ventilating feature and the ease with which light is regulated and controlled without interference with the incoming air. The frames and sash are built by local mills from Architects or Austral details. Austral hardware is supplied and installed by the Austral Sales Corp.

For over 35 years Architects have consistently specified Austral windows for school buildings. In many cases they have been adopted as standard equipment. Over 6000 buildings have been equipped during this period.

Following are the outstanding features of Austral Windows:

(1) They afford a perfect system of ventilation, without direct draft, — without expensive or complicated equipment or operating costs. AUSTRAL WINDOWS may be relied upon to furnish adequate ventilation during the entire school period.

### STRUCTURAL ADVANTAGES

Austral frames are extremely simple in construction consisting of planks  $1\frac{3}{4}$ " x 5" with parting strips 1" x 1". Sash are virtually the same as the double hung window.

Mullions are one half the size of those of the double hung window, yet larger than mullions of light steel windows which are so small that they impart to the schoolhouse an "industrial" appearance.

Austral windows lend themselves readily to weatherstripping and may, without affecting the operation of the sash in the slightest degree, be made tighter than the ordinary double hung window weatherstripped.

\* \* \*

Steel reinforcing members may be inserted in mullions (see detail page 6) which reduce materially the weight of steel lintels where four or five windows are incorporated in a battery.

## Permit:

### 3. SIMPLIFIED FRAME construction costs no more than ordinary DoubleHungWindows

(2) Light is regulated and controlled by the arrangement of Shades on Sash without obstructing the free circulation of air. This arrangement provides an ideal awning effect without added expense.

(3) The Upper and Lower Sash are both reversible for Cleaning or Glazing, eliminating all risk to window cleaners and renders reglazing less expensive.

(4) Ease of operation. Heavy Sash operate as easily as a well-hung door and openings may be regulated as desired. This feature is an AUSTRAL characteristic.

(5) Additional light space is secured by the use of AUSTRAL Plank Frames.

## HARDWARE

Rough Hardware — Balance arms made of heavy gauge pressed steel. Eyebolts attached to ends of balance arms are drop forging, pivots protected by heavy brass bushings. All parts finished electro galvanized.

Austral balance arms are capable of sustaining a load 20 times greater than they are required to carry under actual working conditions.

The simplicity of design and rugged construction of Austral hardware guarantees long life and low maintenance costs.

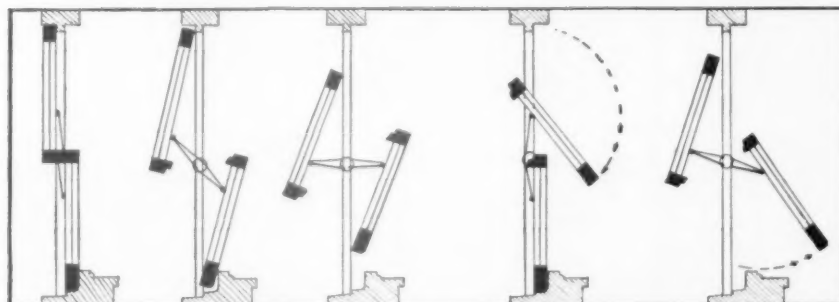
Over a period of nearly 40 years replacements have amounted to less than 1/10 of 1%.

Finish Hardware — Standard finish hardware including combination lock, pulls and turnbuckles of solid bronze polished finish. Special finishes supplied as specified.

Cardboard working model of the Austral window mailed upon request.



Illustrating the method of ventilation through Austral Windows and Wardrobes.



CLOSED POSITION VENTILATION AT MEETING RAILS ONLY FULL VENTILATION UPPER SASH REVERSED FOR CLEANING LOWER SASH SWUNG-IN TO CLEAN EXTERIOR

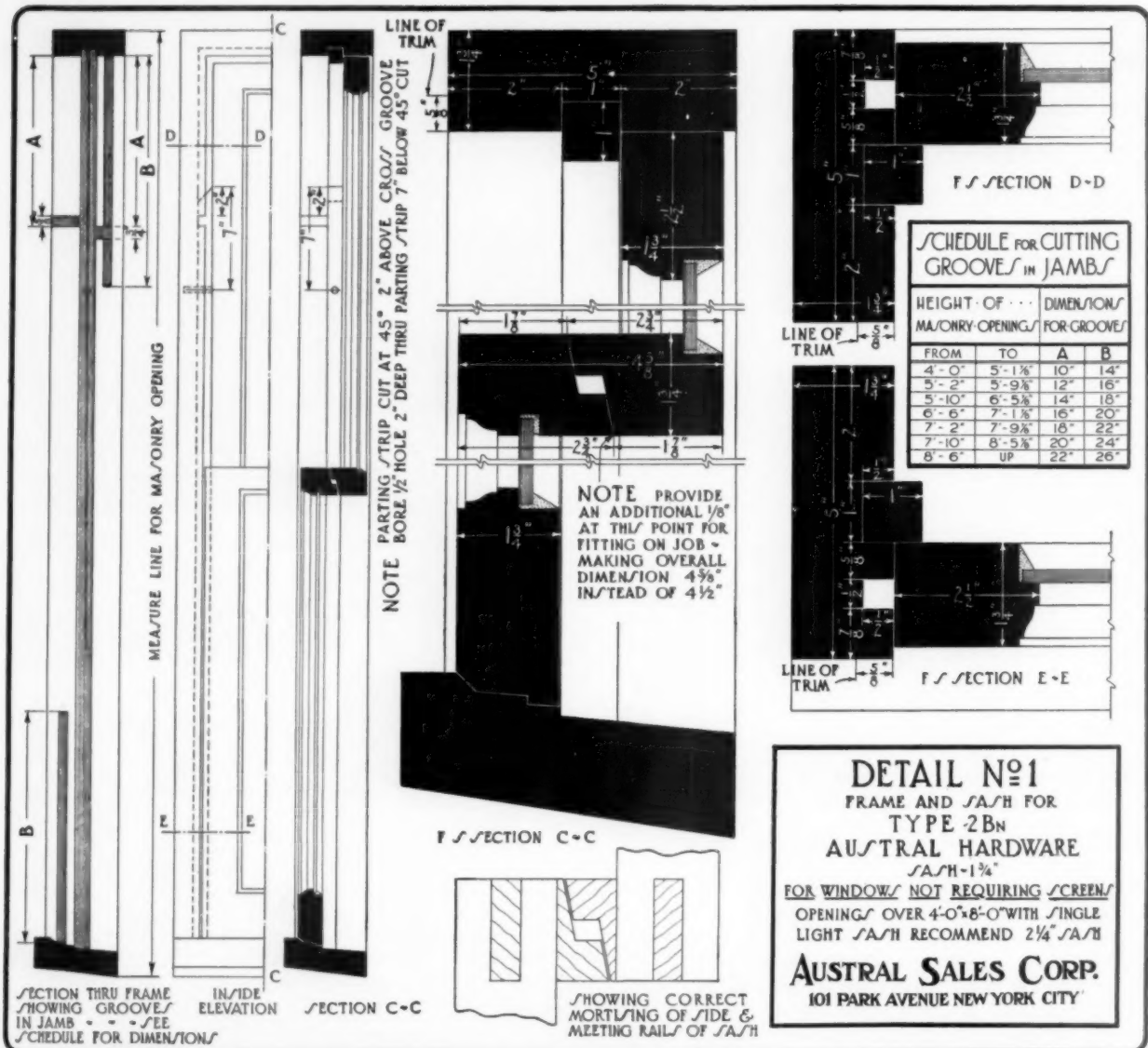
A typical group of Austral Windows as used in classrooms. Note wide opening at the center and the slight opening at the top of the window, but no opening at the sill.



SEE DETAILS ON FOLLOWING PAGES ➡

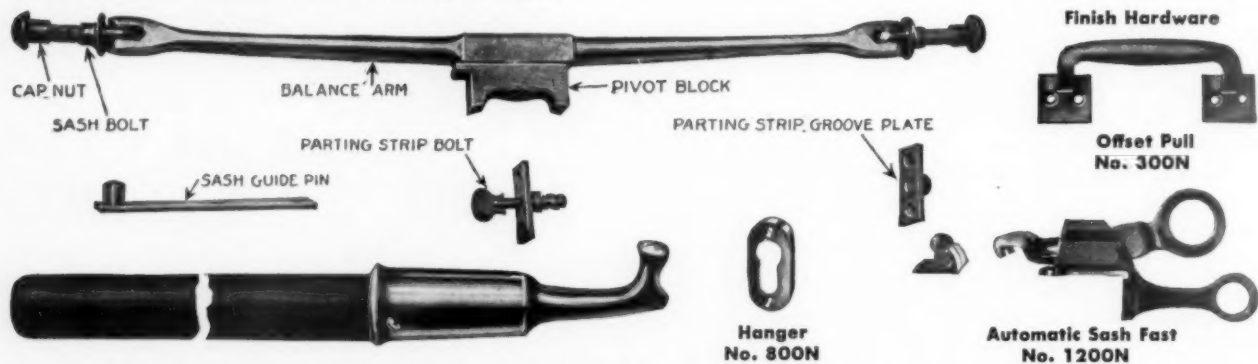
# DETAILS OF WOOD FRAME AND SASH CONSTRUCTION

## FOR WOOD WINDOWS (Not requiring screens)



### TYPE 2Bn AUSTRAL HARDWARE

Full Size Details sent on request



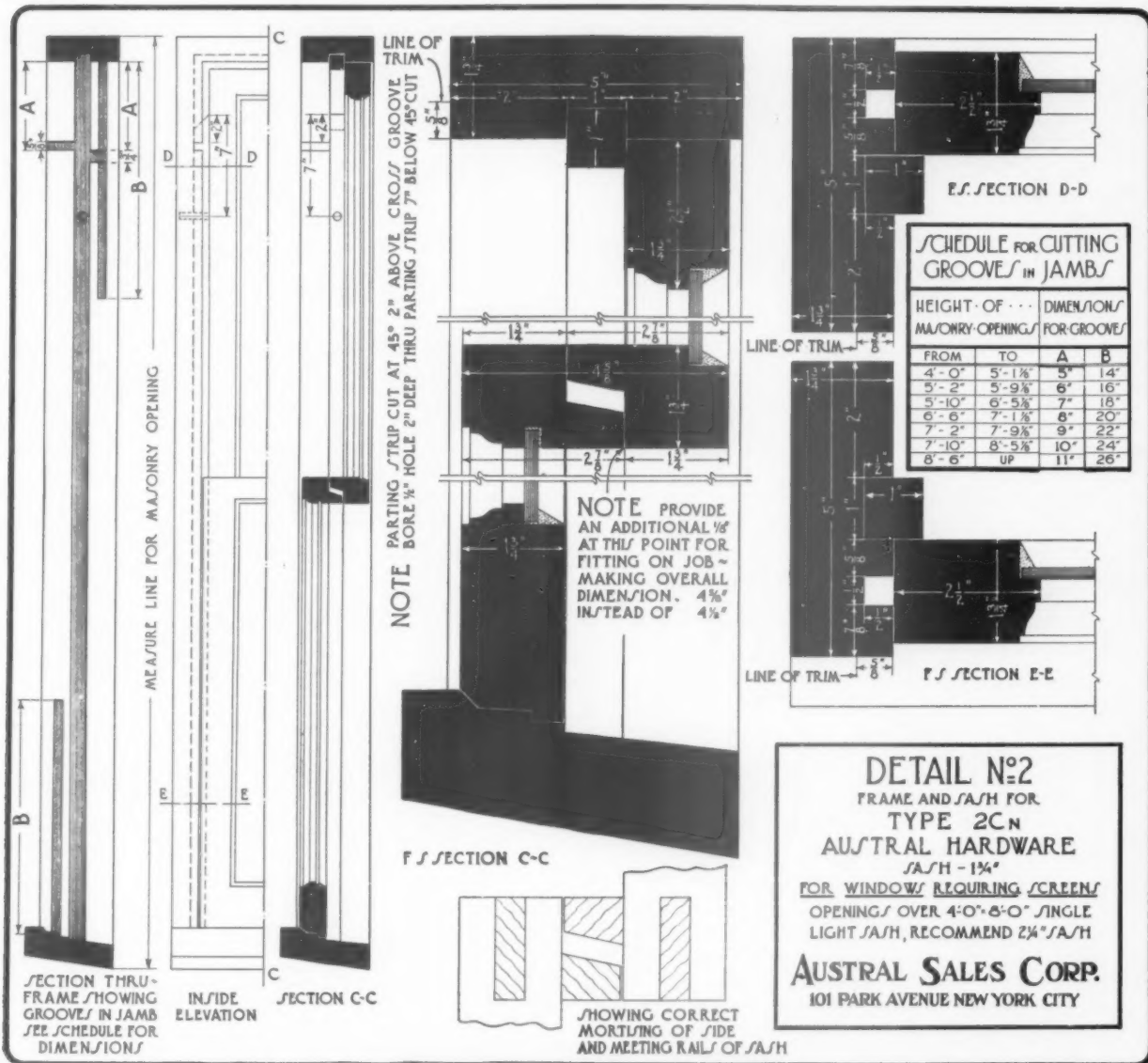
A set of Type 2Bn AUSTRAL HARDWARE consists of the following:

- 2 Balance Arms, with Pivot Blocks, Sash Bolts and Cap Nuts attached
- 4 Sash Guide Pins
- 2 Parting Strip Bolts
- 2 Parting Strip Groove Plates
- Screws for applying all parts

All parts thoroughly Electro Galvanized

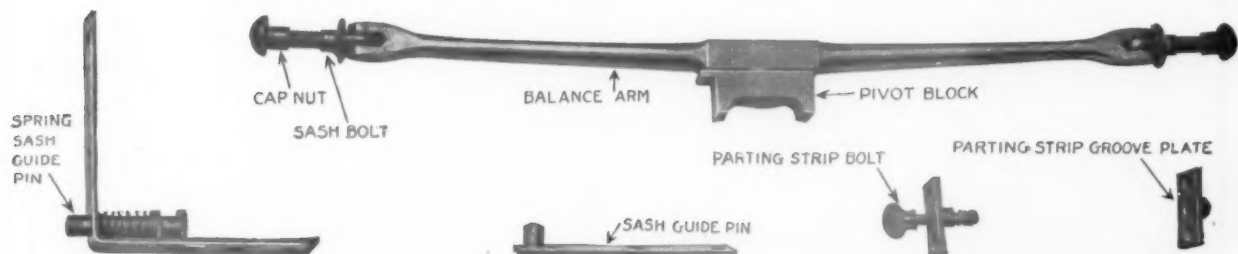


## FOR WOOD WINDOWS (Requiring screens)



### TYPE 2Cn AUSTRAL HARDWARE

Full Size Details sent on request



A set of 2Cn AUSTRAL HARDWARE consists of the following:

- 2 Balance Arms, with Pivot Blocks,
- 2 Sash Bolts and Cap Nuts attached
- 2 Sash Guide Pins
- 2 Spring Sash Guide Pins
- 2 Parting Strip Bolts
- 2 Parting Strip Groove Plates
- Screws for applying all parts

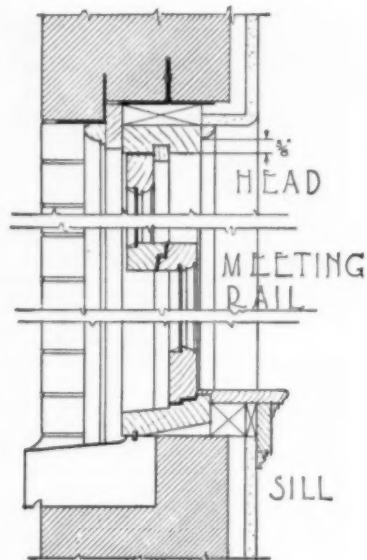
All parts thoroughly Electro Galvanized

Finish Hardware

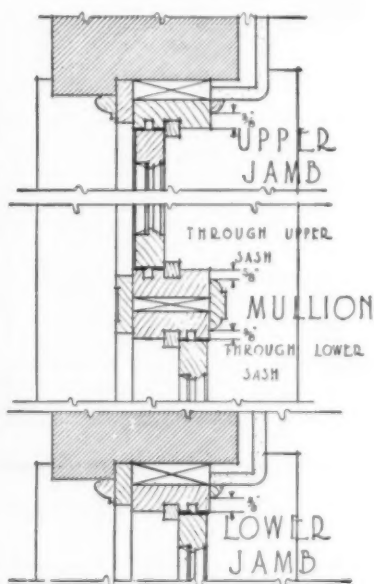


Turnbuckle No. 400

# TYPICAL WOOD WINDOW INSTALLATION DETAILS

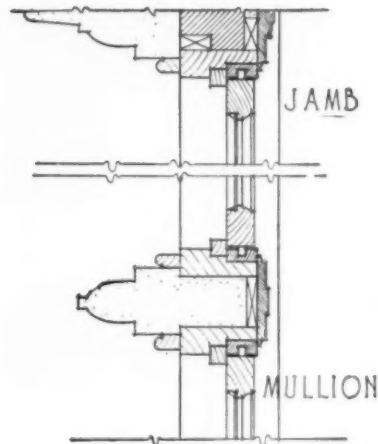


SECTION

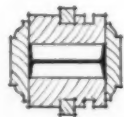


PLAN

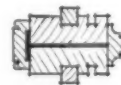
DETAIL "A" AN AUSTRAL WINDOW WITH PLASTER JAMBS SUITABLE FOR SCHOOLS OFFICE BUILDINGS ETC.



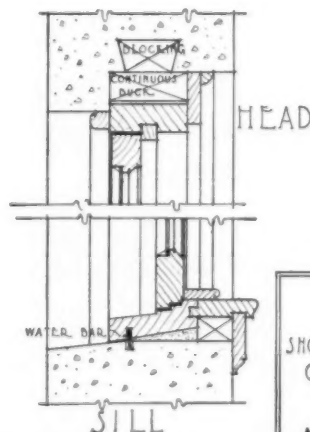
DETAIL "D" AN AUSTRAL FRAME ADAPTED TO STONE WITH HARD WOOD INTERIOR FINISH.



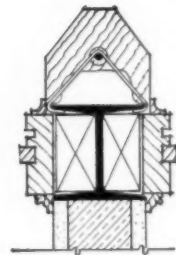
DETAIL "C" MULLION WITH I BEAM REINFORCING



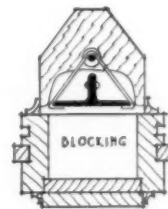
DETAIL "D" MULLION WITH T BAR REINFORCING



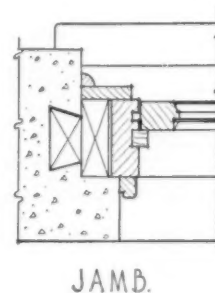
DETAIL "E" SUGGESTED TREATMENT FOR CONCRETE WALLS



DETAIL "F" SHOWING A WINDOW WITH A TERRA COTTA MULLION REINFORCED WITH AN "I" BEAM.



DETAIL "G" SHOWING A TERRA COTTA MULLION REINFORCED WITH ANGLES.



DETAIL N°3

SHOWING VARIOUS CONSTRUCTIONS OF FRAMES, MULLIONS AND INTERIOR TREATMENTS

**AUSTRAL SALES CORP.**  
101 PARK AVENUE NEW YORK CITY

## FOR WOOD WINDOWS (Not requiring screens)

### TYPE 2Bn AUSTRAL HARDWARE

**Frames** — All exterior frames shall be made from clear white pine, well seasoned. The head and sides shall be finished  $1\frac{3}{4}" \times 5"$ , and the sill of  $2" \times 6"$  as per full size detail.

The jambs shall be grooved to receive AUSTRAL HARDWARE. (See Schedule on AUSTRAL DETAIL No. 1, for length of these grooves for various masonry openings.)

The parting strips shall be made of straight-grained white pine  $1" \times 1"$ , in cross section.

**Bracing** — Frames are to be braced with two diagonal braces at head, and one brace, placed horizontally, in center of frame — all to be left in position until sash are to be hung.

**Anchoring** — Frames are to be anchored to metal or wood anchors, placed at intervals of  $24"$  on sides, and to an anchor, in center of head of frame.

**Sash** — The sash shall be  $1\frac{3}{4}"$  thick, made of clear, straight-grained white pine, well seasoned. They shall be made true to required size and molded as per detail.

**Glazing** — Care must be used in glazing, to keep sash of equal weight, as all sash must be in perfect balance.

**Hardware** — The above frames and sash shall be

fitted with Type 2Bn AUSTRAL HARDWARE as made by the AUSTRAL SALES CORP., 101 Park Avenue, New York City, whose working drawings and instructions shall be considered part of these specifications.

**Finish Hardware** — Each pair of sash shall be fitted with one Solid Bronze, No. 1200N (or Malleable Iron No. 7200 $\frac{1}{2}$ N) AUSTRAL AUTOMATIC SASH FAST, to be placed at the center of the meeting rails.

Each pair of sash shall be fitted with one pair of Solid Bronze No. 300N (or Malleable Iron No. 7300 $\frac{1}{2}$ N) AUSTRAL OFFSET PULLS placed on the bottom rail of the lower sash.

**Poles, Hooks and Hangers** — Supply for each class room, oak pole No. 600N,  $4' 6"$  in length, equipped with a solid bronze hook No. 700N and a solid bronze pole hanger No. 800N.

*NOTE: For single light sash, openings exceeding  $4' 6" \times 8' 0"$ , dimensions of frame and sash should be as follows:*

Head and Jambs to finish	$1\frac{3}{4}" \times 6"$
Sill	$3" \times 7"$
Sash	$2\frac{1}{4}"$ thick

*Any opening  $5'$  in width by  $8' 6"$  or over in height should be equipped with  $2\frac{1}{4}"$  sash.*

## FOR WOOD WINDOWS (Requiring screens)

### TYPE 2Cn AUSTRAL HARDWARE

**Frames** — All exterior frames shall be made from clear white pine, well seasoned. The head and sides shall be finished  $1\frac{3}{4}" \times 5"$ , and the sill of  $2" \times 6"$  as per full size detail.

The jambs shall be grooved to receive AUSTRAL HARDWARE. (See Schedule on AUSTRAL DETAIL No. 2, for length of these grooves for various openings.) The parting strips shall be made of straight-grained white pine  $1" \times 1"$ , in cross section.

**Bracing** — Frames are to be braced with two diagonal braces at head, and one brace, placed horizontally, in center of frame — all to be left in position until sash are to be hung.

**Anchoring** — Frames are to be anchored to metal or wood anchors, placed at intervals of  $24"$  on sides, and to an anchor, in center of head of frame.

**Sash** — The sash shall be  $1\frac{3}{4}"$  thick, made of clear, straight-grained white pine, well seasoned. They shall be made true to required size and molded as per detail.

**Glazing** — Care must be used in glazing, to keep

sash of equal weight, as all sash must be in perfect balance.

**Hardware** — The above frames and sash shall be fitted with Type 2Cn AUSTRAL HARDWARE as made by the AUSTRAL SALES CORP., 101 Park Avenue, New York City, whose working drawings and instructions shall be considered part of these specifications.

**Finish Hardware** — Each pair of sash shall be fitted with one pair of solid bronze AUSTRAL TURN-BUCKLES No. 400, to be placed on the side rails of the lower sash.

*NOTE: For single light sash, openings exceeding  $4' 6" \times 8' 0"$ , dimensions of frame and sash should be as follows:*

Head and Jambs to finish	$1\frac{3}{4}" \times 6"$
Sill	$3" \times 7"$
Sash	$2\frac{1}{4}"$ thick

*Any opening  $5'$  in width by  $8' 6"$  or over in height should be equipped with  $2\frac{1}{4}"$  sash.*

Full sized sectional models of the Austral frame and sash furnished to mills for their guidance in manufacturing Austral Windows to be used in conjunction with Architects full sized details.



# AUSTRAL "STRAIGHT 8" SCHOOL WARDROBES



## AUSTRAL "STRAIGHT 8" SCHOOL WARDROBES

Standardization on high-quality steel construction enables Austral to build a superlative wardrobe unit at a new low price. Doors of hollow or pan-type steel construction. Flush type wood doors supplied for wardrobe compartment, supply closet and teacher's closet if desired.

The "Straight-8" unit consists of a five door wardrobe adequate for 40 pupils, teacher's locker, supply closet and bookcase. Any section or sections of the unit may be purchased. The unit affords true minimum spacing and every inch of it is accessible. (Many attempts to solve the classroom wardrobe problem unfortunately result in reducing space below practical limits. Overcrowding and unsanitary conditions are inevitable.) Both the teacher's and pupils' compartments are thoroughly ventilated by large grilles directly over wraps. Cork or slate may be applied to all except bookcase doors. The six-way adjustable hardware on wardrobe compartment doors and the solid bronze surface hardware are standard equipment.

This unit satisfies an insistent demand for adequate space for all requirements without crowding — designed simplicity — low cost — excellent ventilation — sanitation — ease of cleaning. Austral offers the "Straight-8" wardrobe unit as a masterpiece of 25 years of experience in designing and building finer school equipment.

### EIGHT ADVANTAGES

**Design** — An instant impression of finished simplicity is perhaps your first recognition that the Austral "Straight-8" is a truly modern wardrobe. Functional design gives it a symmetry which enhances the appearance of any school-room. The success of a wardrobe installation depends upon the hardware design. Austral rugged six-way adjustment door control hardware renders it possible at all times to bring the doors into perfect alignment which is frequently necessary due to the natural settlement of the building.

**Construction** — All-steel construction, designed by Austral Engineers — built by master craftsmen — give this wardrobe its enduring beauty and strength.

**Durability** — The Austral "Straight-8" will take years of abuse. Yet the doors continue to work smoothly because all operating hardware is machined to exceptional accuracy, and with six-way adjustment, their perfect alignment is insured. Specially treated steel and bronze bearings are to be found wherever steady use would show wear on ordinary bearings.

**Flexibility** — An unusual result of standardizing. The Austral "Straight-8" being composed of the four essential compartments for the classroom, all compartments are interchangeable.

**Adequacy** — Every compartment is roomy, not just barely large enough. The bookcase has separate section for current and reserved books.

**Sanitation** — All floor spaces are free of obstructions; there are no unnecessary projections or dust-catching corners; every surface is enameled inside and out. Result: — cleaning the complete unit requires a minimum of effort.

**Ventilation** — Entering under the doors, and out through large ceiling grilles and ducts, air flows freely through pupils' and teacher's clothing. Garments are not massed in small confined spaces.

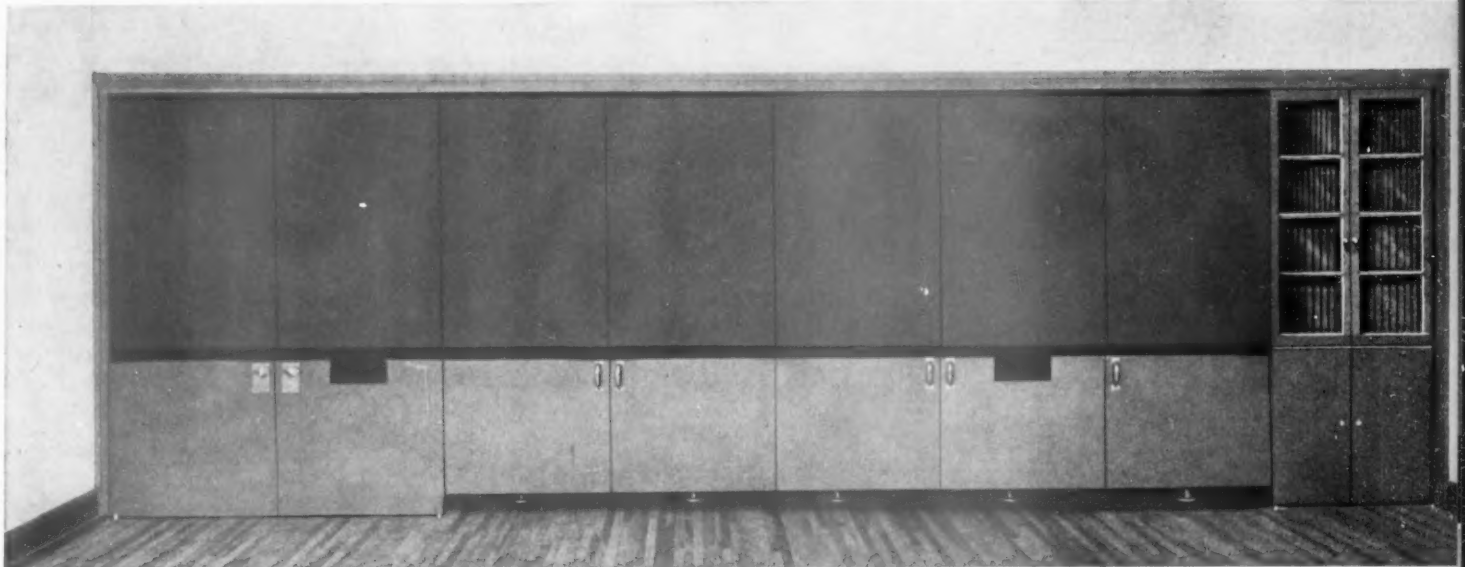
**Economy** — The Austral "Straight-8" will last as long as the school building, which of course is a long-term investment. It contains no single element of the false economy of cheap construction.



8

Detail shows Austral Door Control Hardware with Universal Joints and 6-way Adjusting Devices.

AUSTRAL SALES CORP. - 101 PARK AVENUE, NEW YORK 17, N. Y.



## SPECIFICATIONS

**Wardrobes, General** — Pupils' Wardrobes, teacher's closet, storage closet, as shown on plans and elevations, shall be equipped with flush steel doors provided with door control hardware, latches, locks and pivots. Jambs, heads, shelving, cross bracing and wall angles to be of steel of gauge specified. The bookcase shall be provided with two (2) hinged doors with glazing strips.

Pupils' Wardrobe to be equipped with coat racks and suitable hooks. Teacher's closet to be provided with one (1) steel shelf and coat hooks.

Storage closet to be provided with six (6) adjustable steel shelves. Bookcase to be provided with five (5) steel shelves.

All to be furnished and erected by the Austral Sales Corp., 101 Park Avenue, New York, N. Y. The recesses to receive this unit and all necessary grounds, bucks, trim paint and staining, glass and mirrors to be furnished and installed by others.

**Doors, Metal** — Doors, except for bookcase, shall be flush pan type, of 18 gauge steel reinforced for hardware.

**Hardware** — Door control hardware shall consist of rigid offset pivot arms, extending from the floor pivot to the top of wardrobe. The pivot arms to be equipped with a "six-way" adjustment device, universal joints, and ball bearing pivots, all machined to accuracy.

**Finish Hardware** — All wardrobe doors to be equipped with "anti-rattle" latches with handles of solid bronze. Teacher's closet and supply closet doors to be provided with steel hinges and a special "anti-rattle" lock with two keys.

**Metal Jambs** — Jambs and head to be of 18 gauge steel, cross bracing 20 gauge, wall angle 14 gauge. The entire unit to be covered

with 20 gauge steel welded to cross bracing. Grilles to be provided in ceiling of pupils' wardrobe compartment and teacher's closet.

**Wardrobe Interiors** — Each section of the wardrobe to be provided with standard coat rack suspended from cross bracing, consisting of two shelves and one hanging strip, provided with forty (40) double prong coat hooks. Provide metal partitions between storage closet, teacher's closet and wardrobe.

**Operation** — Door operating mechanism shall be so constructed as to hold the face of doors, when closed, in perfect alignment and in a straight and rigid position, providing a continuous flush surface.

**Finish** — All metal work for the entire unit to receive two coats of standard enamel, baked on.

**Guarantee** — The entire wardrobe and equipment shall be guaranteed against all mechanical defects, for a period of one year from the date of final acceptance of the building. No painting or staining of metal work, glass or glazing, other than above specified to be included in this contract.

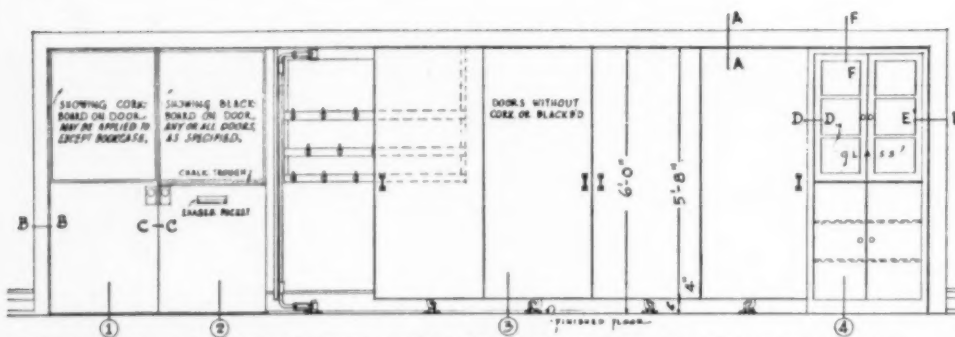
## Add Following if Processed Slate or Cork Is Required

**Processed Slate** — Equip all wardrobe, teacher's closet and storage closet doors with best grade processed slate,  $\frac{3}{8}$ " thick, or cork  $\frac{1}{4}$ " thick, extending the full width of doors, held in position by means of metal angles.

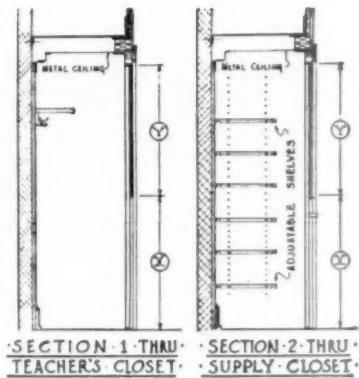
**Chalk Rails, Etc.** — Provide metal slate angles and metal chalk rails directly under the slate angle, extending the full width of the door; two eight-inch metal eraser pocket. All to be of 14 gauge steel.



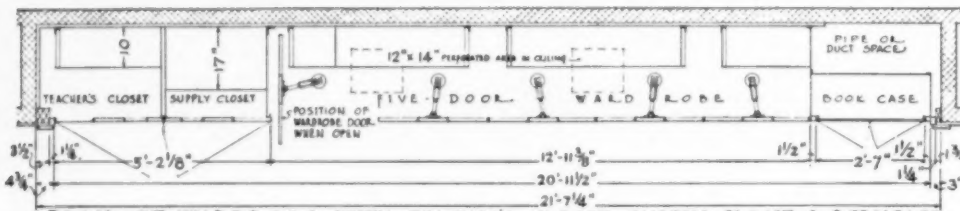
# AUSTRAL "STRAIGHT 8" ALL STEEL WARDROBE



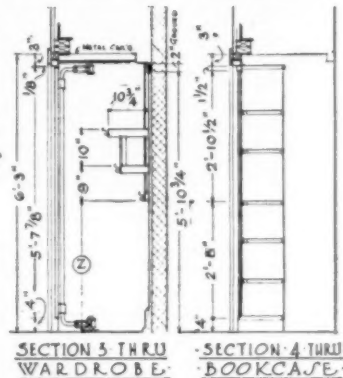
ELEVATION OF WARDROBE WITH TEACHER'S CLOSET · SUPPLY CLOSET & BOOKCASE.



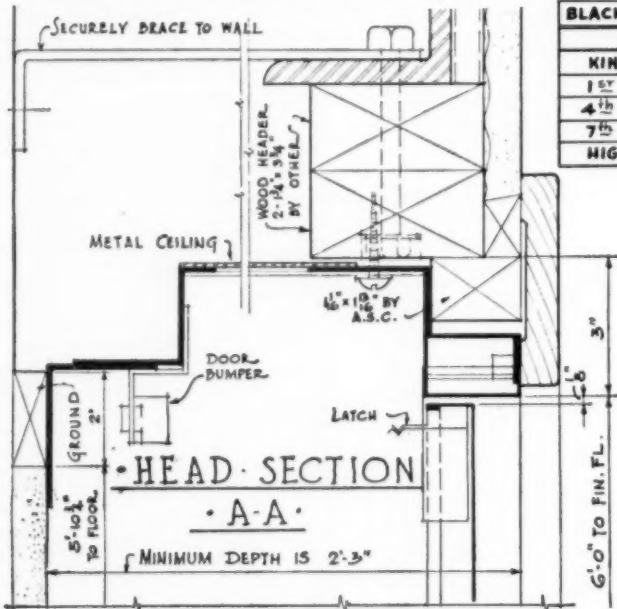
SECTION 1 THRU TEACHER'S CLOSET · SECTION 2 THRU SUPPLY CLOSET.



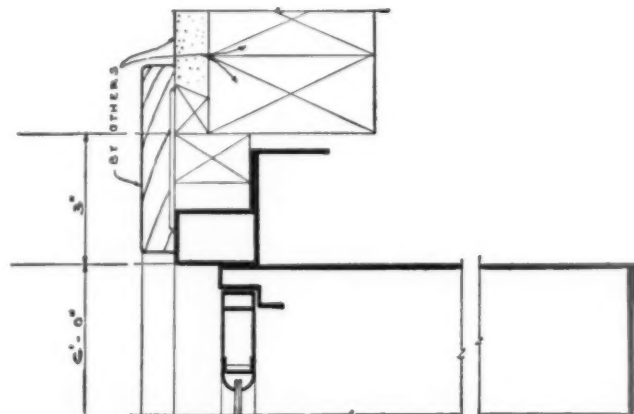
PLAN OF WARDROBE WITH TEACHER'S CLOSET · SUPPLY CLOSET & BOOKCASE.



SECTION 3 THRU WARDROBE · SECTION 4 THRU BOOKCASE.



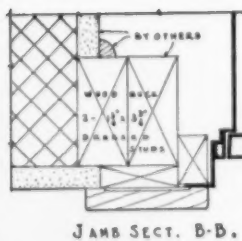
BLACKBOARD & SHELVING DIMENSIONS			
GRADES	X	Y	Z
KINDERGARTEN	25 1/8"	46 1/4"	32"
1 <sup>ST</sup> , 2 <sup>ND</sup> , 3 <sup>RD</sup>	27 1/8"	44 1/4"	32"
4 <sup>TH</sup> , 5 <sup>TH</sup> , 6 <sup>TH</sup>	29 1/8"	42 1/4"	36"
7 <sup>TH</sup> , 8 <sup>TH</sup>	35 1/8"	36 1/4"	42"
HIGH SCHOOL	35 1/8"	36 1/4"	42"



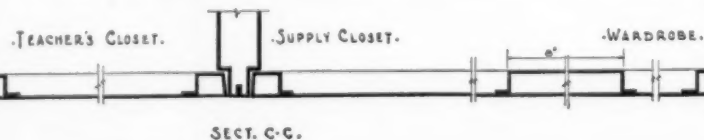
SECTION F-F.

SCHEDULE OF STANDARD OPENING DIMENSIONS					
ARRANGEMENT	WARDROBE ONLY	WARDROBE & BOOKCASE	WARDROBE & 1 CLOSET	WARDROBE BOOKCASE & 1 CLOSET	WARDROBE BOOKCASE & 2 CLOSETS
METAL JMB.WDT.	12'-11 1/8"	15'-9 1/8"	15'-6 1/2"	18'-5 1/2"	20'-11 1/2"
WOOD JMB.WDT.	13'-1 1/8"	15'-11 1/8"	15'-9"	18'-8"	21'-2"

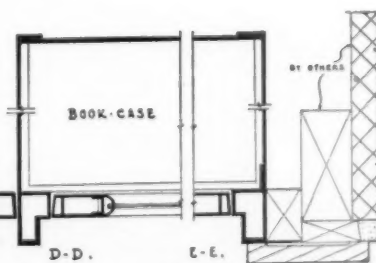
NOTE: THE BOOKCASE IS INTERCHANGEABLE IN LOCATION WITH EITHER THE TEACHERS CLOSET OR THE SUPPLY CLOSET



JAMB SECT. B-B.



SECT. C-C.



JAMB SECTIONS



### INCREASES FUNCTIONS OF CLASSROOM

**The Multi-Use Blackboard Fixtures** — Increases the functions of the classroom by instantly adapting it for Art, Music, Nature Study, Craft, Exhibition, or other study purposes.

This means that, since it is no longer necessary to provide special rooms for the foregoing purposes, construction costs are greatly reduced.

And, in old buildings, all such special rooms may now be released for standard purposes. The teacher finds this device a real help in imparting knowledge to the pupil, and that it creates interest in school work more readily.

It will be found desirable for use wherever lectures are given, bulletins posted, or art work displayed. Also for special uses in churches, offices and factories.

(No. 1) As a Blackboard — Every panel is reversible. Panels with blackboard one side and cork on reverse side are usually preferred, but panels may be had with both sides blackboard or cork.

Obviously, these reversible panels in reality give the classroom double the ordinary amount of working surface. For example, 10 panels would present 90 square feet of blackboard surface, but another 90 square feet of cork surface may be instantly brought into use by merely reversing the 10 panels.

The instructor may prepare the work in advance on the blackboard side and then divulge it to the students at the desired time.

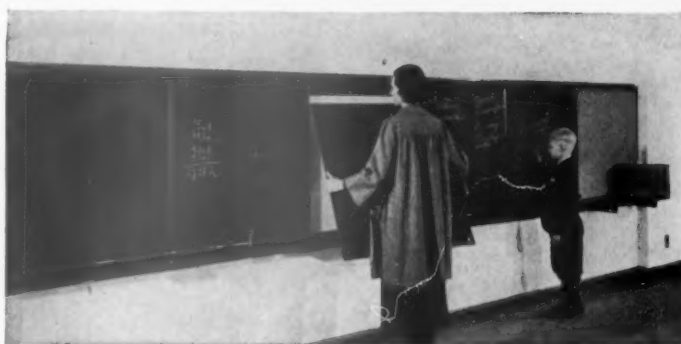
The panels are light weight and easily reversed. In old buildings, installation is made directly over existing slate, thus doubling the utility of this area.

(No. 2) As a Display Board — Any desired portion of blackboard area may be converted into display area by reversing the leaf, bringing the cork side out. Educational material may be readily pinned to the cork side. Whether for exhibition or for class instruction the work displayed is always at the proper visual height.

(No. 3) As a Display Shelf and Work Board — With leaf in vertical position, the work boards placed upon brackets and engaged thereto, provide display shelves or work benches. These work benches are sufficiently strong for all ordinary school craft, such as Nature Study, Clay Modeling, etc. They may also be used for displaying completed work, or as a base for chart standard. Unquestionably, the ingenious teacher will find many other uses.

(No. 4) As an Art Easel — Two pivoted metal brackets (attached to the channel below the rail strip) permit the leaf to be brought forward into easel position as shown above. The color tray catches any drip from painting, thus both wall and floor are properly protected. The youngest student can set up this arrangement instantly. No part of the easel touches the floor and it is always at proper height.

(No. 5) As a Corridor Exhibition Board — The leaf of the fixture becomes a movable display board when hung from permanently installed hooks or pegs, the finger eyelets being utilized for this purpose. The instructor may prepare his display in the classroom before placing the leaf in the corridor position, thus avoiding confusion in the corridor, damage to its wall surface, etc.



1



2



3

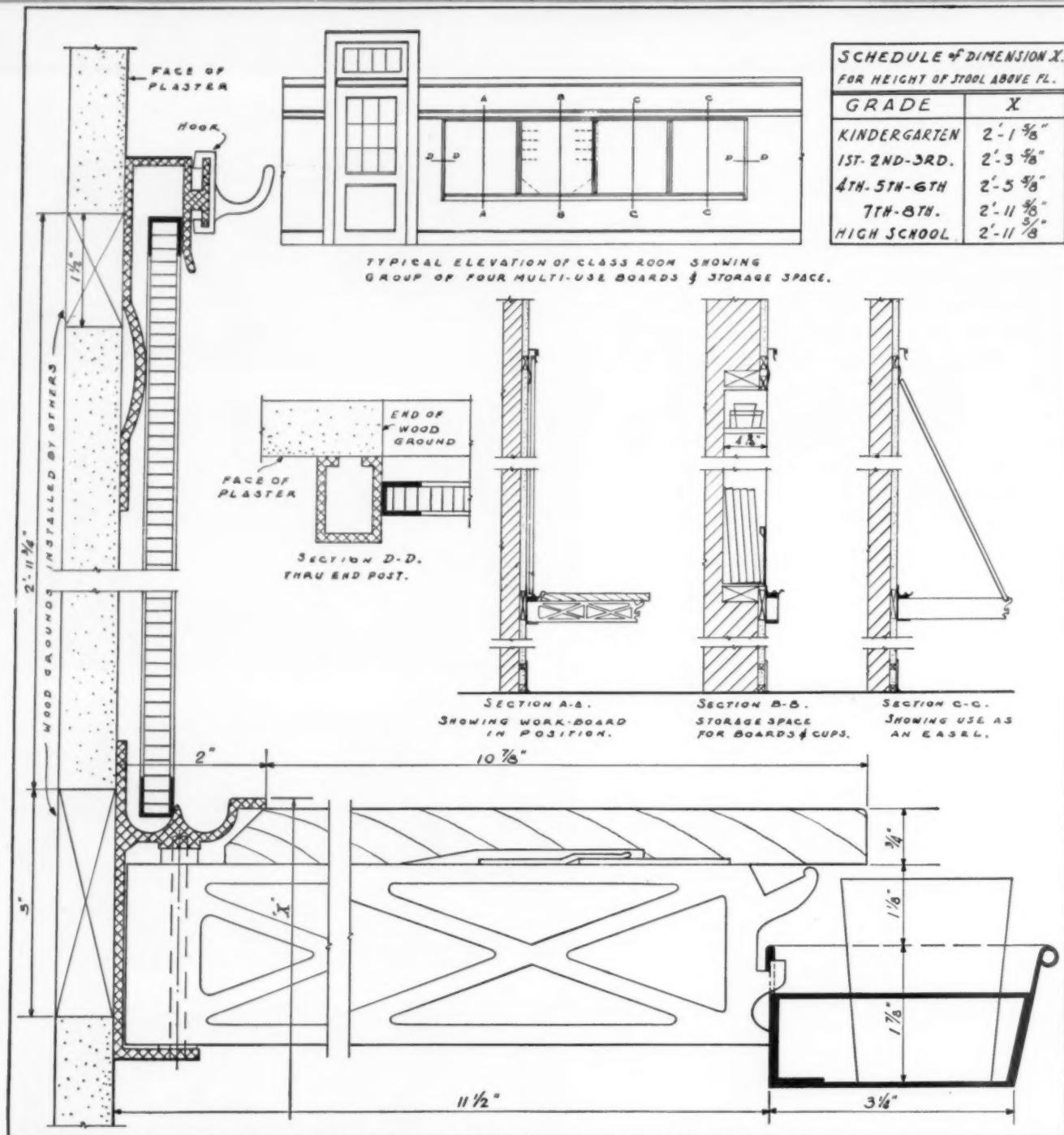


4



5

# AUSTRAL MULTI-USE BLACKBOARD FIXTURE



## SPECIFICATIONS — Austral Multi-Use Blackboard Fixtures

**Fixtures, General** — Furnish and install in all classrooms where indicated the Multi-Use Blackboard Fixture, consisting of head strip, stool strip with channel, brackets and eraser holder, combination blackboard and corkboard panel, work shelf and paint tray, as manufactured by the Austral Sales Corporation, 101 Park Avenue, New York, N. Y., whose working drawings and details shall be considered a part of this specification. Any grounds, trim, painting or staining other than that specified herein shall be furnished and installed by others.

**Aluminum Members** — The head, stool strip and vertical ends shall be extruded aluminum aluminite finish; brackets and eraser pockets to be cast aluminum. Head and stool strips to be secured to grounds by bolts and screws.

**Panel** — The panels shall be 36" x 36" composition board with a writing surface of black (or green) on one side and cork surface on the others.

**Work Shelf** — The work shelf shall be of best grade straight grained White Pine or Cedar, free from knots 3/8" thick.

**Tray and Jar Holder** — Metal tray of 24 gauge steel. Insert of 24 gauge steel provided with seven (7) openings to receive paint jars. Finish black enamel. (Paint jars by others.)

**Grounds** — Contractors shall provide and set suitable grounds securely anchored to the wall, grounds to be set true and plumb.

**Storage Cabinets** — Furnish and install steel storage cabinet where indicated on plans and elevations.

# AUSTRAL SALES CORPORATION

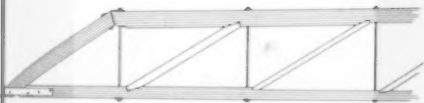
101 Park Avenue

New York 17, N. Y.

# Engineering in Wood

**For Modern School Buildings**

AUDITORIUMS  
LABORATORIES  
FIELD HOUSES  
GRANDSTANDS  
LIBRARIES  
VOCATIONAL SHOPS  
GYMNASIUMS  
BLEACHERS



PARALLEL CHORD  
TRUSSES



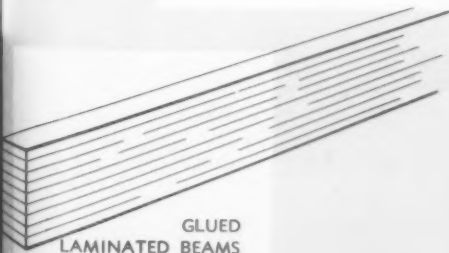
TIMTRUSS  
BOWSTRING TRUSSES



TRUSSED RAFTERS



BOOMERANG  
GLUED LAMINATED  
ARCHES



GLUED  
LAMINATED BEAMS



**TIMBER STRUCTURES, INC.**



# Engineered for Economy of Construction and Maintenance...

*Clear Span Areas*

## FOR FIELD HOUSES

Timber Structures roof trusses make it possible to cover large areas without the use of interior posts or supports of any kind, as shown in the University of Minnesota field house which appears at the right. Here are more than two acres of unobstructed floor space with span of 200 feet.

Timber Structures is prepared to advise regarding the selection of the proper type of truss, to design and fabricate both the trusses and framing members, and to render erection service where desired.

## Permanent, Low Cost Playrooms

Using glued laminated buttressed arches to form the roof supports, gymnasiums like that shown on the preceding page can be built at moderate cost—in some cases less than half the usual amount of structures of this kind.

For maximum economy, three-inch decking is applied directly to the arches. End walls may be masonry or frame construction.

Interior arrangements are adaptable for a number of purposes requiring clear floor space and an attractive appearance worthy of the finest school plants.

**A**S DESIGNED and fabricated by Timber Structures, Inc., wood is one of the most durable and genuinely economical of all building materials. Douglas fir, basic material of Timber Structures engineered wood construction, is among the strongest of woods—straight grained, tough, resilient, moderately hard, exceptionally durable. It is beautifully figured, easily finished, long wearing, and ideal for modern design and lamination. All design work issued by Timber Structures, Inc. is by registered structural engineers.

University of Minnesota field house  
Minneapolis, Minn. C. H. Johnson  
architects-engineers, St. Paul, Minn.



With precision equipment and skilled personnel, this durable wood is fabricated into structures that provide utmost usefulness, long service and minimum maintenance expense.

Favorable fire insurance rate is an important advantage of Timber Structures heavy timber construction. By nature, wood is a good insulating material which does not transmit heat into the interior of the piece. When fabricated as heavy timber construction, the natural fire resistivity is preserved, and its load bearing qualities remain after exposure to high temperatures. As a result fire insurance rates are favorable.



## Glued Laminated Beams for Distinctive Rooms

For moderately wide rooms where a flat ceiling is desirable, Timber Structures glued laminated beams provide a practical and impressive solution. They are widely used for libraries, auditoriums, lecture halls, gymnasium and classrooms.

By combining built-in camber with tapering, glued laminated beams function as primary members of the roof structure. Using a single joist system, the roof deck frequently is placed on top, with ceiling placed on the under side between exposed decorative beams.

Beams may be stained or painted, or they may be of clear finish to retain the rich natural beauty of the wood.

## Utility and Beauty with Glued Laminated Arches

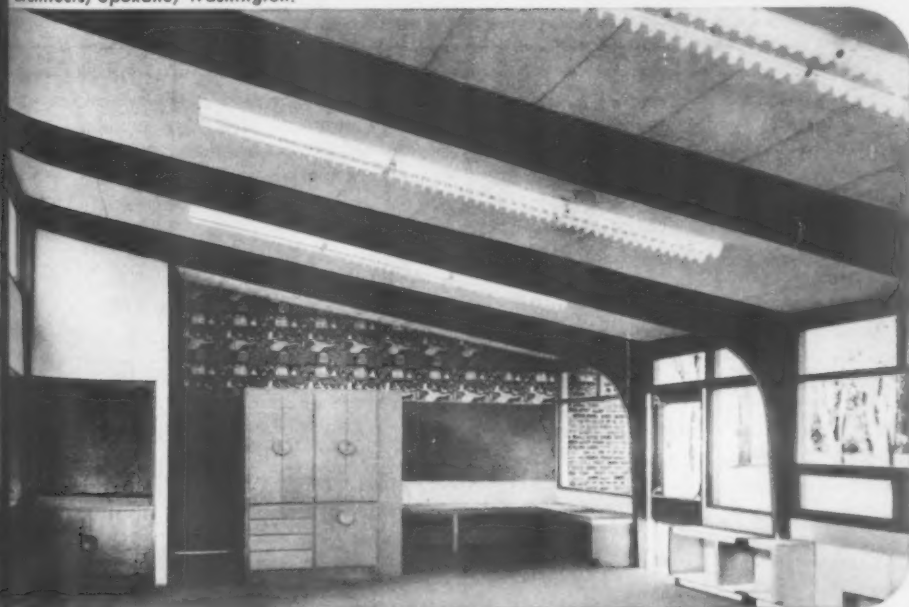
For buildings such as chapels, gymnasiums, shops, etc. Timber Structures glued laminated arches are both effective and economical. They fulfill the design motif and serve as structural members that form the sides and roof of the building.

Any desired shape may be obtained, and the resulting member is stronger than sawn timbers of equal size. Made of kiln dried lumber, the arches will never shrink, check, twist or warp.



Elementary school, Edmonds, Washington. William Arild Johnson, architect, Everett, Washington.

Elementary school, Waitsburg, Washington. Funk, Molander & Johnson, architects, Spokane, Washington.





## Permanent Grandstands

Typical of Timber Structures grandstands is this installation at Grange Field, Wheaton, Illinois. It seats 3,000 spectators comfortably and safely. Dimensions are 60 feet by 174 feet by 32 feet high. At the top of the stand is a press box, 9 by 18 feet in size, and a 4-foot walkway the full length of the stand. It is planned to add a roof later. Similarly permanent and safe grandstands may be designed for crowds of any size, for any sport, and to fit any location.



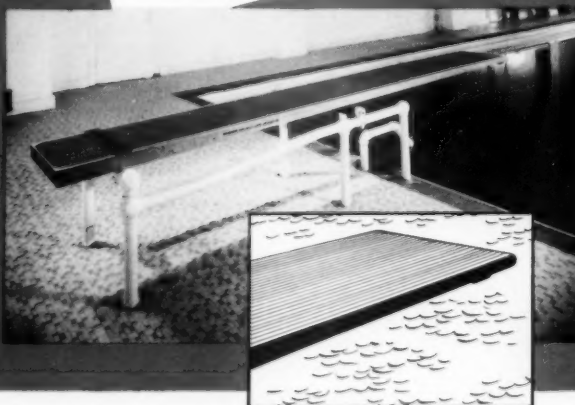
## Portable Bleachers

For both inside and outside use, these bleachers are made in sizes that will fit the needs of any school. They are quickly erected and dismantled. Light in weight, they are moved easily and stored in a small space.

Timber Structures bleachers are designed for safety, and built of strong, durable timbers. Weight of the spectators is evenly distributed throughout the bleachers, and lock-fitting construction insures lasting rigidity. To resist weather, all metal parts are galvanized or cadmium plated. Delivery can be made on short notice.



## Ray Daughters Diving Boards



Official diving board at 1948 Olympic Games. Composed of  $\frac{3}{4}$ " kiln dried boards selected for slope of grain and permanently laminated with waterproof glue into a board of uniform strength and flexibility. Boards are  $19\frac{1}{2}$ " minimum width and 14 or 16 feet long with constant taper from 3" at fulcrum end to  $1\frac{1}{2}$ " at diving end. All surfaces are given a waterproof finish and wrapped in heavy paper and crated for shipment.

# TIMBER STRUCTURES, INC.

P. O. BOX 3782, PORTLAND 8, OREGON

PLANTS: PORTLAND AND EUGENE, OREGON

Agents and Distributors Coast to Coast

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OFFICES: SACRAMENTO 18, CALIF. — 2326 16th ST. • SANTA ROSA, CALIF. — 800 NORTH ST.

## TIMBER STRUCTURES OF CANADA, LTD.

Box 837, Bank of Commerce Building, Peterborough, Ontario

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# ARCH ROOF CONSTRUCTION CO., INC.

Engineers and Contractors

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DISTRICT REPRESENTATIVES IN PRINCIPAL CITIES



SWARTHMORE COLLEGE FIELD HOUSE

## ECONOMY

### in Physical Education Buildings



HANOVER COLLEGE—GYMNASIUM



BUCKNELL UNIVERSITY—GYMNASIUM

### FEATURES

- ★ LOW INITIAL COST
- ★ MINIMUM MAINTENANCE
- ★ CLEAR SPANS TO 800 FEET
- ★ PERMANENCE
- ★ ARCHITECTURAL BEAUTY
- ★ COMPLETE UTILITY

As specialists for the past 28 years in the design, fabrication and erection of DAVIDSON PATENTED STEEL ARCHES for GYMNASIUMS, FIELD HOUSES, AUDITORIUMS, THEATRES, HANGARS, etc., we have developed the necessary "know-how" in efficient construction and maintenance, resulting in economical buildings.

We cooperate with architects and engineers in preparing plans and estimates for long span buildings. There is no obligation for this service.

Inquiries are invited regarding design, construction, and cost of completed buildings.

#### United States Patents

1,480,882 January 15, 1924  
1,639,930 August 23, 1927  
1,783,958 December 9, 1930  
1,795,331 March 10, 1931  
1,891,346 December 20, 1932  
2,021,480 November 19, 1935  
2,031,937 February 25, 1936  
2,211,848 August 20, 1940  
2,376,906 May 29, 1945

#### Canadian Patents

329,165 January 10, 1933  
331,206 March 28, 1933

#### Great Britain Patents

382,138 January 18, 1932



SETON HALL UNIVERSITY—AUDITORIUM AND GYMNASIUM

## LONG SPAN ROOF ARCHES

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# BLAW-KNOX DIVISION

of Blaw-Knox Company  
UNIVERSAL BUILDINGS DEPARTMENT  
Blawnox, Pa.

## ALL-STEEL, FACTORY INSULATED BUILDINGS FOR SCHOOL USE



Blaw-Knox Universal Building being used as an auditorium at Prestonia, Kentucky. Building is 40' x 80' x 12'

Designed for quick erection, flexible arrangement and economy, Blaw-Knox Universal Buildings make ideal permanent or temporary school structures. They offer a quick remedy for crowded schools because they can be erected quickly and easily enlarged or converted from one use to another. Use them for classrooms, science laboratories, shops, auditoriums, cafeterias, or wherever a sturdy and economical structure is needed. Standard, interchangeable panels permit construction of any size building desired. Interiors can be finished to meet any requirement, changed to meet changing conditions.

Completely insulated before leaving the factory, Blaw-Knox Universal Buildings are easy to heat and comfortable in winter or summer. Fully approved fenestration makes classrooms bright and cheerful. All-steel construction gives these buildings lifetime durability and maximum safety from fire. Either as auxiliary buildings in a large school plant, or as rural and district school buildings, Blaw-Knox Universal Buildings are economical and highly practical, and their exceptionally sturdy construction keeps long-term maintenance costs down to almost nothing. Bulletin 2258 describes *all* the advantages, gives construction details and specifications. Send for your copy today, giving the size and purpose of the buildings you need.



Interior of building illustrated above. Note fenestration, brightly lighted interior and attractive appearance

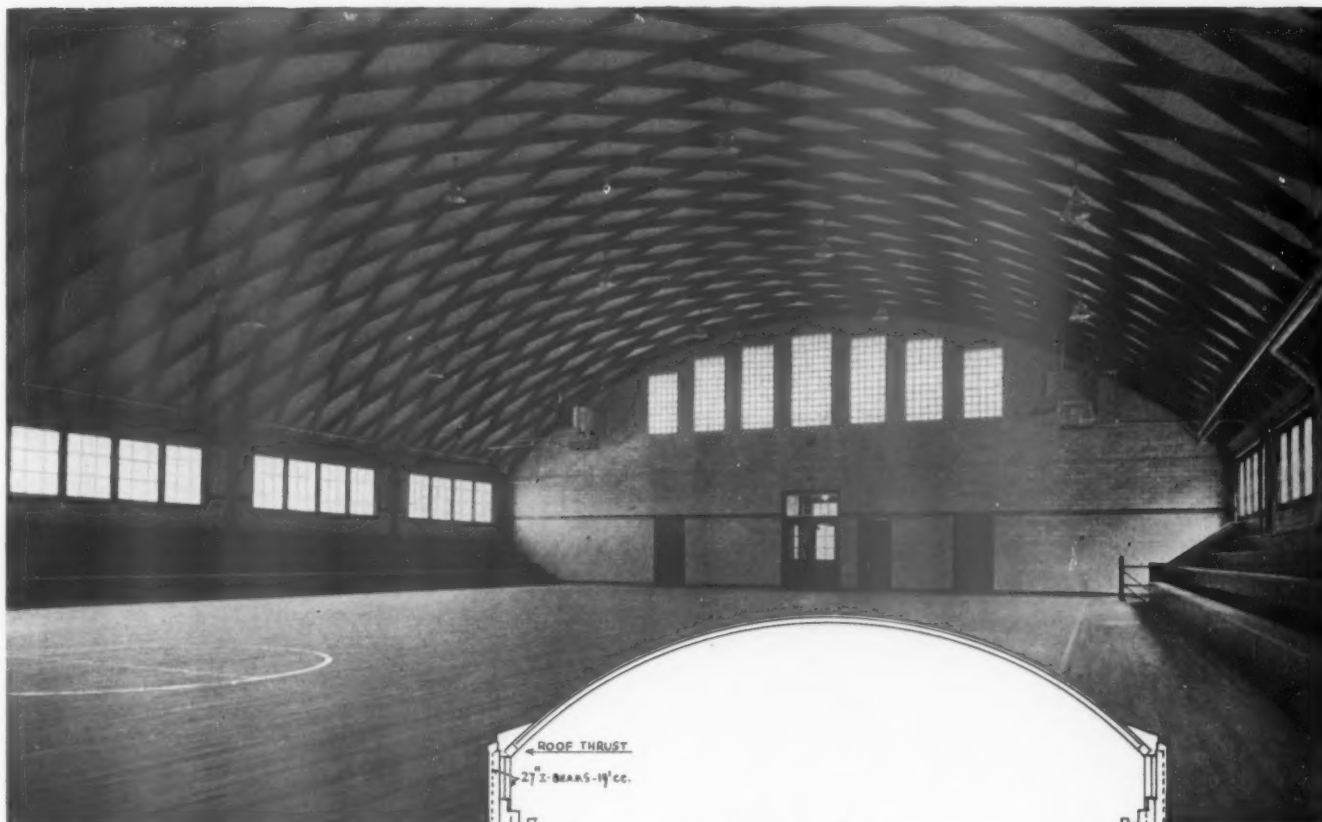
Classroom in a Blaw-Knox Universal Building. Distribution of natural light keeps use of artificial lighting down to an absolute minimum



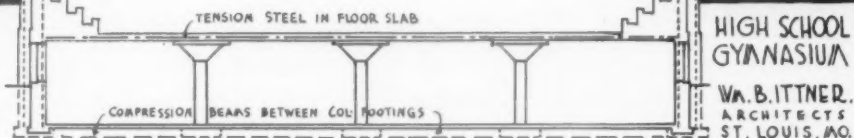
Group of Blaw-Knox Universal Buildings at Prestonia Consolidated School, Prestonia, Kentucky. Note how well they blend with surrounding architecture. Their neat, low lines and fully insulated interiors make them comfortable in either hot or cold weather. No waste heat to heat or maintain

# ROOF STRUCTURES, INC.

122 W. Lockwood, Webster Groves 19, Mo.



PANEL INSULATED LAMELLA ROOF STRUCTURE, CLEAR TYPE BLDG. INSIDE 72', PLAYING FIELD 50' HEIGHT AT SIDEWALLS 11'-6", AT EDGE OF PLAYING FIELD 19'-6", IN CENTER 26'-6"



HIGH SCHOOL GYMNASIUM  
W.A. B. ITTNER, ARCHITECTS  
ST. LOUIS, MO.

**LAMELLA ROOF = GREATEST BUILDING ECONOMY**

**LAMELLA ROOF = BETTER CEILING CLEARANCE**

**LAMELLA ROOF = ATTRACTIVE CEILING PATTERNS**

**LAMELLA ROOF = SIMPLEST ACOUSTICAL TREATMENT**

**LAMELLA ROOFS ARE POPULAR WITH ARCHITECTS & SCHOOL BOARDS**

PANEL INSULATED CLEAR TYPE LAMELLA ROOF 72' x 95' - 11'-6" SIDE WALLS

*Lamella Roofs  
are furnished installed & are  
being used increasingly--in-  
vestigate NOW their use &  
adaptability on your project.*

WEST OF THE ROCKY MOUNTAINS:

**SUMMERBELL ROOF STRUCTURES**  
LOS ANGELES 11, CALIFORNIA



# ALBERENE STONE CORPORATION OF VIRGINIA

Quarriers and Fabricators of Alberene Soapstone  
Serpentine and Tremolite

419 Fourth Avenue, New York 16, N. Y.

Quarries and Mills at Schuyler, Va.

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Toronto, Ont.

## ALBERENE SOAPSTONE

Alberene Soapstone is a natural quarried stone of medium hardness, having an abrasive hardness factor of  $\pm 6$ . Its blue-grey color harmonizes well with any decorative pattern, and its durable, moisture-proof surface does not chip, scale, or split. Alberene Soapstone is easily machined—bored, slotted, grooved, tongued, turned—without splitting or spalling. Its ability to be cut into thin sections makes for definite economies.

### Interior Uses

Window stools  
Toilet partitions  
Shower compartments

### Exterior Uses

Mullions  
Spandrels  
Window sills and trim  
Coping

## ALBERENE "DARK STONES" (SERPENTINE AND TREMOLITE)

Alberene "Dark Stones" are especially desirable for exterior use because of their great resistance to weather action, their durability and their excellent retention of polish. Alberene Black Serpentine takes a high polish that is essentially black with a slight greenish cast. Alberene Tremolite polishes to give a color tone varying from blue-grey to blue-black. Both Serpentine and Tremolite are exceedingly dense and homogeneous in structure, free of cleavage planes, and have a fine grain. When machine tooled they hold sharp arrises. They are tough, as distinguished from brittle, and highly abrasion resistant (abrasive hardness factor

for Serpentine is 30-45; for Tremolite, 20-30). Their ability to be cut into thin sections— $\frac{7}{8}$ ",  $1\frac{1}{4}$ " is normal—makes for definite economies. Both stones are obtainable in comparatively large sizes at reasonable cost. For interior uses, Alberene "Dark Stones" are valuable wherever a dark, durable material is called for.

### Interior Uses

Stair strings and risers  
Base and border  
Window stools

### Exterior Uses

Mullions  
Spandrels  
Window sills and trim  
Bulkheads  
Facing  
Coping

## ALBERENE TREAD STOCK

Alberene Tread Stock is Tremolite or Serpentine grade stone selected for its abrasive resistance and durability but unselected as to color when polished. On the National Bureau of Standards scale the abrasive hardness factor averages 30 to 45—highest abrasive resistance factor of any natural stone commercially used for stairway work. When furnished in a natural rubbed surface, Alberene Tread Stock has a peculiar toothed surface which is non-slipping, both dry and wet, but not so gripping as to unduly check the foot. It is a pleasing light blue-grey in color and harmonizes well with other materials. The stone is uniformly granular in all directions and is free of lamination or cleavage planes. It has great density and toughness, and when machined will hold sharp arrises.



Typical architectural use of Alberene Stone—spandrels in a modern school building



Attractive stairway and landing in an elementary school—stair treads and flooring are of Alberene Stone

FOR FURTHER INFORMATION, SEE CHEMICAL SECTION.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# A. F. SCHWERT MANUFACTURING CO.

90th ANNIVERSARY — 1860 - 1950

3215 McClure Avenue, Pittsburgh 12, Pa.

## SCHWERT WOOD COLUMNS

Since 1860 the A. F. Schwerdt Manufacturing Co. has been contributing to the architecture of this country, wood columns that are not only correct artistically, but scientifically. Many of these columns, installed in buildings a quarter of a century ago, are in as good condition as when they left our factory. Our painstaking attention to detail in the manufacture of these columns has made the name "Schwerdt's Quality Columns" known throughout the building industry.

### services to architects

During our years of experience in cooperating with architects on the highest class of work for all types of buildings we have developed a complete line of standard columns and pilasters. These designs are in accordance with best practice and are illustrated and described in our latest catalog. Copy will be sent on request. Where the architect wishes to use his own design we can offer complete facilities for production and service, and welcome an opportunity to cooperate in any way.



Hall of International Affairs  
Lafayette College  
Easton, Pennsylvania

4 Detail Columns 30" x 25" x 26'  
2 F Pilasters to match

Donald F. Innes, Architect  
Eisenhardt Mills, Inc., Millwork

### typical installations

University of Louisville Law Building,  
Louisville, Ky.  
4 Detail 36" x 24'  
J. F. Larson, Architect

Mary Washington College, Fredericksburg,  
Va.  
4 Detail 32" x 29'  
J. Bindcrd Walford, Architect

State Teachers College, Hattiesburg, Miss.  
4 Detail 30 1/2" x 21'  
Shaw & Woleben, Architects

Peace Institute, Raleigh, N. C.  
4 Detail 36" x 20'  
Atwood & Nash, Architects

Harvard School of Business, Cambridge,  
Mass.  
6 Detail 48" x 40'  
McKim, Mead & White, Architects

Colby College, Waterville, Me.  
8 Detail 43" x 23'; 6 Detail 24" x 23';  
4 Detail 31" x 26'; 4 Detail 30" x 24'  
Jens F. Larson, Architect

Washington & Jefferson College, Washing-  
ton, Pa.  
4 Detail 30" x 22'  
Jens F. Larson, Architect

Amherst College, Amherst, Mass.  
8 Detail 36" x 22'  
McKim, Mead & White, Architects

Ira Allen Chapel, University of Vermont  
6 Detail 34" x 32'  
McKim, Mead & White, Architects

North Gadsden School, Gadsden, Ala.  
4 Detail 12" x 13' 7"  
Paul W. Hofferbert, Architect

Hanover College, Hanover, Ind.  
4 Detail 20" x 18'  
McGuire & Shook, Architects

Hood College, Frederick, Md.  
12 Detail 21" x 14'  
Jens Frederick Larson, Architect

Sussex School, Shaker Heights, Ohio  
4 Detail 8" x 7" (capola columns)  
Charles B. Rowley, Architect

### why Schwerdt columns are durable

Ninety years' experience in the manufacture of wood columns has demonstrated the soundness of the principle that the strength of the joint in any wood column depends upon three major factors: the quality and strength of the glue, the area of the gluing surface, and the extent to which the glue penetrates the wood without leaving a pocket of coagulated, uncompressed glue. Every architect, cabinet maker and builder knows that, if the plain smooth edges of two boards are properly glued together with a high grade, waterproof glue and the joint is compressed to force the glue into the wood and force out all extra unused glue, those boards will break anywhere except at the glue joint. This has been proved in every demonstration test as well as under actual service conditions.

Since every wood column must be constructed of many such pieces of wood (staves) each of which must be perfectly aligned and glued to each other, it is obvious that the strength of a column will depend upon the use of the best, thoroughly seasoned lumber (we recommend Northern White Pine), perfectly machined staves; glued with highest quality glue and assembled under pressure.

Realizing these facts, Schwerdt column construction was developed to meet each specific requirement. The shape of the staves is obtained on special stave making machines which were developed by Schwerdt. These machines shape and taper, tongue and groove the staves in one operation. The result, when the staves are glued together, is a shaft which has the proper taper and entasis and the subsequent lathe turning operation removes only the roughness of the lumber without weakening the shaft. The columns are therefore equally heavy at any point in their length—an important detail in the life of the support.

It will be noted that the staves are formed with a tongue and groove. This tongue and groove is of no importance in determining the strength of the column. It is used merely as an aid in properly aligning and assembling the staves into columnar form.

Subsequent operations; compressing the shaft by Schwerdt patented clamps which exert a force of 5,000 pounds to drive the glue into the wood and squeeze out excess glue, drying, turning, fluting, finishing, painting, crating and shipping are all conducted with the same skill, pride of workmanship and a knowledge gained by 90 years of specialized experience.

The result is a product on which the architect can rely with complete confidence—a product fully entitled to be specified as a "Schwerdt Quality Column."

### composition capitals

The use of composition capitals has become so general that very little need be said about them. They are durable, strong, artistic and very much cheaper than hand carving. Stock model designs of various orders of architecture can be furnished. We also have facilities to furnish special models to details.

### ventilated plinths

Ventilated Cast Iron Plinths are recommended to avoid checking and opening of wood plinths and to prevent water from entering the wood base members where it will eventually cause decay. They also provide for circulation of air to the inside of the column shaft, which is a very essential feature. Schwerdt cast iron plinths are smooth and when painted, harmonize with the finish of the column.



### turned wood posts and copper lanterns for exterior lighting

Posts are made from dry, Northern White Pine (toxic treated), accurately milled, pressure glued and then turned on lathes. This construction is stronger than a solid wood post and will withstand the elements longer. All posts are 8' high with the lower 18" dipped in asphaltum paint to give extra moisture protection. Each post is finished with two coats of lead-zinc undercoating. Ample wiring space is provided throughout the height of the post, permitting the use of pipe, lead cable or conduit. Lanterns are made of extra heavy copper with all joints double-locked and soldered. Standard finish is dull black with clear glass panels supplied.

We stock 8 posts and 5 copper lanterns of different design, and also manufacture posts and lanterns to Architect's details.

### lamppost installations

Rutgers University, New Brunswick, N. J.  
22 Detail 11' lampposts  
York & Sawyer, Architects

Muhlenberg College, Allentown, Pa.  
18 — 5 1/2" x 10' lampposts  
Our Detail P-85

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# TRUSCON STEEL COMPANY

Youngstown 1, Ohio

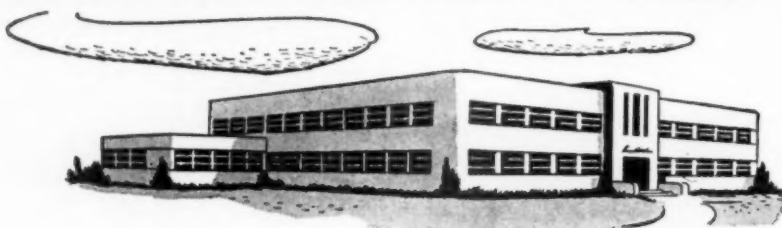
Reg. U. S. Pat. Off.

Subsidiary of Republic Steel Corporation

Manufacturers of a Complete Line of Steel Windows and Mechanical Operators . . . Steel Joists . . . Metal Lath . . . Steeldeck Roofs . . . Reinforcing Steel . . . Industrial and Hangar Steel Doors . . . Bank Vault Reinforcing . . . Radio Towers . . . Bridge Floors

## SCHOOLS MUST BE SAFE..

## PLAY SAFE WITH TRUSCON STEEL BUILDING PRODUCTS FOR SCHOOLS



● You can meet the safety requirements of school buildings with Truscon's complete line of steel building products. They are fire-resistant and their load carrying ability provides an extra margin of safety. They also afford you an unlimited opportunity to create beautiful buildings that are in pace with modern teaching methods.

Every Truscon building product is scientifically designed and factory produced. That's why they reach your job accurate, complete, ready to be installed easily and quickly.

An experienced Truscon engineer in your community will be glad to assist you in adapting Truscon Steel Building Products to your particular requirements.



### ARCHITECTURAL PROJECTED WINDOWS

Attractive in appearance and convenient to operate. Provide maximum daylight, ventilation and freedom from drafts. Heavy one piece casement type sections in ventilator assures rigidity. Hardware is solid bronze. Screens and underscreen operating hardware are available for all ventilators.



### DONOVAN AWNING TYPE WINDOWS

These windows are basically practical in the correct admission of light and proper ventilation without drafts. Sturdily built of unusually heavy special casement sections, they are positively and easily operated. Assure a high quality product incorporating features not available in any other window design.

### DOUBLE-HUNG WINDOWS

#### in Two Types—Series 138 and Series 46

Series 138 Windows are equipped with positive action motor-spring type balances and completely weatherstripped with stainless steel. Made from electro-galvanized strip, these fabricated windows are bonderized and finished with a baked-on prime coat of paint. Available in single units or in integrally built twin, triple and panoramic window units. All are available with or without sill ventilators.



Series 46 windows are of the counter-weighted or spring balance design. Single or twin units may be had in either standard or special sizes and are available with or without sill ventilators. Made from new billet steel, electro-galvanized. Windows are Bonderized and finished with a baked-on prime coat of paint.



### INTERMEDIATE CASEMENT WINDOWS



Constructed of specially designed one-piece sections throughout. Accurate weathering is assured through the final cold-rolling of sections to produce positive contacts between weathering surfaces. Hardware is solid bronze furnished in medium statuary finish.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



## INTERMEDIATE CLASSROOM WINDOWS

Offer: (1) increased light effectiveness, (2) marked economy in original cost, (3) superior maintenance in window washing and glass replacement. Can be secured with bottom vent only opening, or both vents opening.

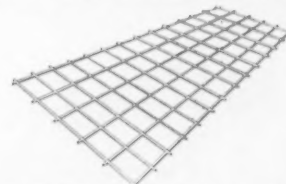


## CURB BARS



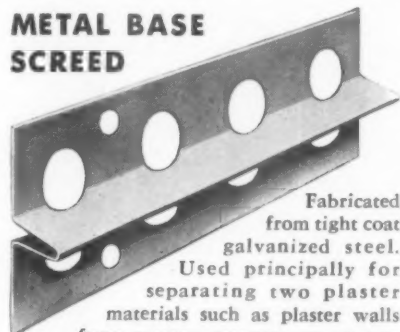
Protect exposed corners of concrete curbs, walls, steps, etc. Designed to give positive anchorage into the concrete. Plate surrounds and protects the corner without splitting concrete into two portions.

## WELDED WIRE FABRIC



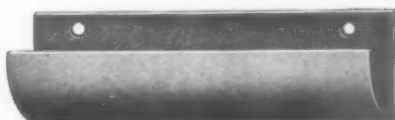
Truscon Welded Wire Fabric is made in various sizes for concrete reinforcing in all types of structures. Each joint is electrically welded for permanence.

## METAL BASE SCREED



Fabricated from tight coat galvanized steel. Used principally for separating two plaster materials such as plaster walls from cement, terrazzo, or composition base, and separating a cement wainscot from ordinary plaster. Another function is to give a permanent straight edge to which both trades work.

## METAL CASINGS



Meet a definite demand for an artistic, sanitary method of trimming around doors and windows. Afford many architectural effects. Metal casings are fire-resistant, vermin proof, easy to maintain and do not shrink or warp.

## FERROBORD STEELDECK ROOFS



Truscon Ferrobord provides a fire-resistant, economical roof deck for all new construction or replacements. Covered with insulation and waterproofing, it weighs approximately 5 pounds per square foot.

## CONCRETE REINFORCING BARS



A special rolled section of high grade steel, with a series of longitudinal and diagonal ribs, so designed to provide the maximum bond with the enclosing concrete.

## PRESSED STEEL INSERTS



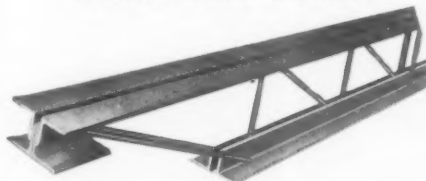
Truscon Slotted Inserts are attached to the forms and are completely imbedded in the concrete. Bolt can be moved along slot to any location, allowing wide variation in position. Used in ceilings, slabs, beams or columns.

## OPEN TRUSS STEEL JOISTS



Truscon developed the open truss steel joist to meet the demand for economical, light weight, fire-resistant floors in schools, and other light-occupancy buildings. They are easy to install. Completely shop fabricated, they reach the job ready for placing.

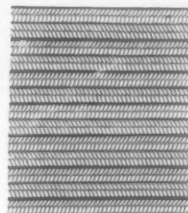
## CLERESPAN JOISTS



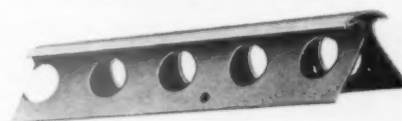
Truscon "Clerespan" Joists meet all clear span requirements up to 80 feet. They eliminate undesirable columns and provide greater unobstructed floor areas, in gymnasiums and auditoriums.

## METAL LATH

There is a Truscon Metal Lath for every plastering requirement. Flat laths for ceilings and sidewalls; rib laths to reinforce concrete floors or plaster ceilings; expanded laths for stucco reinforcement; Corner Beads and Cornerite, to protect outside and inside corners.



## CORNER BEADS



Recommended as an exposed corner reinforcement. The round nose is strongly reinforced by a deep groove which holds the plaster flush for a perfect bond. It can be wired, stapled or nailed to any kind of wall construction without the use of clips.

# INLAND STEEL PRODUCTS COMPANY

Milwaukee 1, Wisconsin

BALTIMORE 24, MD.  
DETROIT 2, MICH.

BUFFALO 11, N. Y.  
KANSAS CITY 8, MO.

CHICAGO 9, ILL.  
LOS ANGELES 23, CALIF.

CINCINNATI 25, OHIO  
NEW YORK 22, N. Y.

CLEVELAND 14, OHIO  
ROCHESTER 9, N. Y.

## Milcor Metal Trim

*For every interior detail*

- ✓ for modern appearance
- ✓ for fire resistance
- ✓ for sanitation
- ✓ for durability
- ✓ for easy maintenance

### Milcor Metal Window Trim

Includes: (a) Completely mitred, welded frames ready to install; (b) individual units, flush or projecting for assembly and installation. Provides modern architectural effect; (c) combinations of sections to form any part of window opening. Standard or expanded plaster flanges. Complete or  $\frac{3}{4}$  frames in any size to meet specifications up to 8' x 12'. Square, projecting or radius stools.



Milcor No. 501  
Mitred and Welded Window  
Trim Assembly with Standard  
Flange

Milcor No. 501  
Window Stool with Cast  
Filling No. 500-H

### Milcor Metal Access Doors

Three types with or without expanded metal wing. Provide instant access to key points in plumbing, heating, electrical, and refrigerating systems. Fit flush to wall. Flush, cam-type lock. Removable or hinged door. Eleven sizes from 8  $\frac{3}{8}$ " x 8  $\frac{3}{8}$ " to 24  $\frac{1}{8}$ " x 36  $\frac{1}{8}$ ".



### Milcor Metal Bases

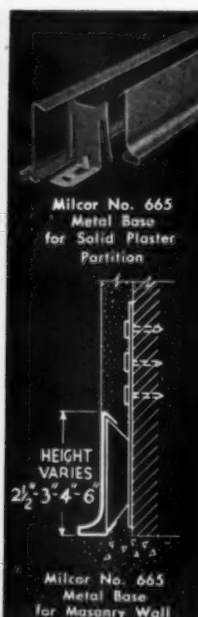
Available in many practical designs, sizes and weights. Two types: (1) Flush or plastered-in; (2) Applied or removable. With prime-coat, to accept any subsequent painting or decorative treatment. Angle-fittings and terminals to match. Blackboard trim, chalk trough, chair rail, moulding and other accessories also available.

### Milcor Sound-Deadening Insulmat

Reduces sound reverberation as much as 90%. Fire-resistant asphalt composition applied to all styles of Milcor Metal Trim at slight additional cost. Regularly furnished on Milcor Chalk Trough at no extra cost.



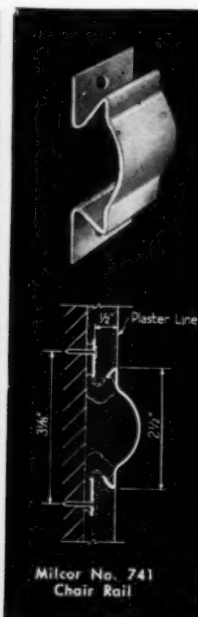
Milcor No. 601  
Metal Base  
with Expansion Flange



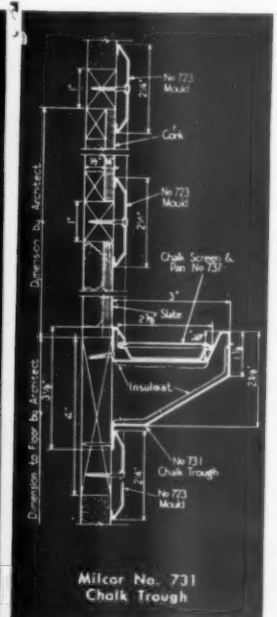
Milcor No. 665  
Metal Base  
for Solid Plaster  
Partition

HEIGHT  
VARIES  
2  $\frac{1}{2}$ "-3"-4"-6"

Milcor No. 665  
Metal Base  
for Masonry Wall



Milcor No. 741  
Chair Rail



Milcor No. 731  
Chalk Trough

Write for  
**FREE**  
MILCOR METAL  
TRIM  
CATALOG

**INLAND STEEL PRODUCTS COMPANY**

Formerly MILCOR STEEL COMPANY  
MILWAUKEE 1 WISCONSIN

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# MACOMBER, INCORPORATED

1923 Tenth St., N. E., Canton, Ohio

**TO HELP YOU BUILD  
WITHIN THE BUDGET**

**The Economy of Standardized  
Load Bearing Units**

**TO ASSURE A FIRE-  
RESISTIVE SCHOOL**

**Macomber Steel is a  
Barrier Against Fire Losses**

**TO HAVE COMPLETE  
BUILDER ACCEPTANCE**

**28 Years of School  
Building Experience is Yours**

Your architect and general contractor know and believe in the brand of engineering responsible for the preference given Macomber Steel Building Products. Here they are:

**MACOMBER NAILABLE STEEL BAR JOISTS** to support class room and corridor floors. Metal lath is NAILED, not clipped to these all-steel floor joists to prevent deep pockets of wasted concrete between joists. Nailing is faster than wiring. Anchorage is positive and a plastered ceiling below on metal lath is a rated fire barrier to the floors above. A standard cataloged product for all spans—4 to 40 feet.

**MACOMBER LONGSPANS** for gym and field house roof construction. Sturdy steel load bearing units in nation-wide use for spans to 72 feet. Completely standardized for fast, economical delivery.

**MACOMBER STEEL ROOF TRUSSES** for auditoriums, experiment stations, shop buildings, stadiums or other large enclosures. Thoroughly standardized and available to 180 foot spans with all bracing, roof purlins and steel decking for an insulated, built-up roof covering.

**MACOMBER UTILITY BUILDINGS** or open shed type for housing, protection or storage of school plant equipment. Steel or aluminum siding and roofing completes these buildings of light steel framing.



*Our Complete Catalog File Forwarded without Obligation. Send for it.*

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



# CONCRETE PLANK COMPANY

15 Exchange Place, Jersey City, N. J.

## Floor and Roof Installations

Through years of experience, the Concrete Plank Co. has perfected an organization equipped to solve the most difficult roof and floor construction problems.

Our Engineering Department will consult with engineers, architects, builders, and school officials in order to submit prices for furnishing and erecting concrete plank.

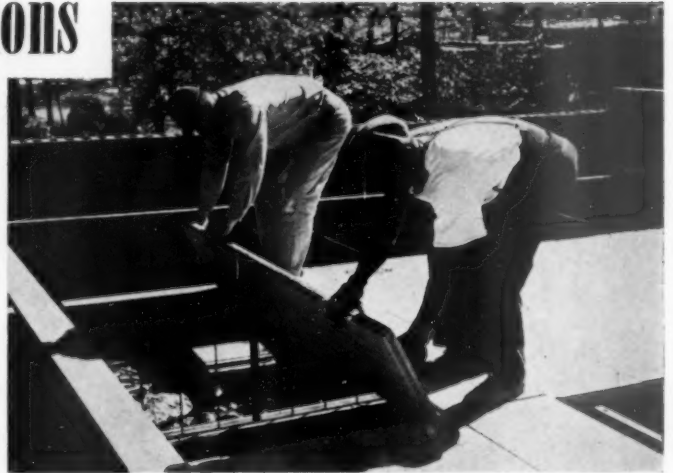
Our plant is well-organized with an annual capacity of three million square feet of concrete plank. Experienced men are able to cast any size job in accurately machined steel forms assuring complete control and accuracy of dimensions.

Erection crews of experienced mechanics, under capable, trained foremen, having the finest equipment obtainable, are able to handle each job quickly and efficiently.

Concrete Plank is light-weight, nailable and easily cut in the field. In laying, it is clipped to steel, wood or concrete beams. Floors or roof materials are nailed to it.

Concrete Plank is composed of cellular portland cement concrete of a selected mix, reinforced by two full-length courses of steel mesh. Reinforcement consists of galvanized steel wire rods welded where they cross and embedded near the top and bottom of the plank. Planks are factory-made in steel forms to give a smooth even surface on all sides and to assure proper positioning of the reinforcing steel. All edges are generally tongued and grooved.

Concrete Plank is approved by cities, architects and engineers. University and testing laboratory tests are available on request.



### List of Typical Jobs

LOWER PENNS NECK SCHOOL	Salem County, N. J.
ADELPHI COLLEGE	Garden City, N. Y.
WASHINGTON STREET SCHOOL	L. I., N. Y.
KENSINGTON SCHOOL	L. I., N. Y.
CHRISTIAN BROTHERS ACADEMY	Albany, N. Y.
JOHNS HOPKINS UNIVERSITY	Baltimore, Md.
CORNELL UNIVERSITY	Ithaca, N. Y.
RUTGERS UNIVERSITY	New Brunswick, N. J.
PARK and ROOSEVELT SCHOOLS	Ossining, N. Y.
THE CHOATE SCHOOL	Wallingford, Conn.
HARTSDALE SCHOOL	Hartsdale, N. Y.
HOFSTRA COLLEGE	Hempstead, N. Y.
CAMDEN ELEMENTARY SCHOOL	E. Camden, N. J.
LINCOLN SCHOOL	Englewood, N. J.
LONG BEACH HIGH SCHOOL	Long Beach, N. Y.
HARVARD FORESTRY SCHOOL	Petersham, Mass.
GOUCHER COLLEGE	Towson, Md.
U. S. MILITARY ACADEMY	West Point, N. Y.
MILLBROOK SCHOOL FOR BOYS	Millbrook, N. Y.
FORDHAM UNIVERSITY	Bronx, N. Y.
KENT SCHOOL	Kent, N. Y.
JULIAN CURTISS SCHOOL	Greenwich, Conn.



Seaman Avenue School, Freeport, Long Island, New York

St. Catherine School, Riverside, Connecticut

# PITTSBURGH CORNING CORPORATION

Dept. C-0, 307 Fourth Avenue, Pittsburgh 22, Pa.

The roof of this fine modern school building, the Rochester Institute of Technology, at Rochester, New York, is insulated with PC Foamglas. More than 26,000 square feet of 2" Foamglas were applied to the poured concrete roof deck and covered with roofing material.



## Here's why so many school boards prefer PC FOAMGLAS . . . the Long Life Insulation

On prominent schools all over the country, PC Foamglas has won wide favor as roof insulation. And many school boards have found that they can also insulate walls and floors with PC Foamglas, effectively and economically, mainly for these three reasons:

**IT'S EFFECTIVE INSULATION . . .** PC Foamglas is a true glass in cellular form. Its millions of sealed glass cells contain still air. That is why PC Foamglas proves an effective aid in maintaining desired temperature levels.

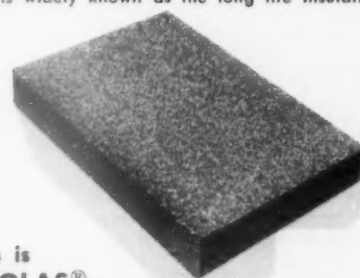
**IT'S RIGID AND STRONG . . .** Foamglas blocks are so rigid that they readily support their own weight when built into walls. They do not pack down, check, shrink or swell. They are so strong that—when used under cover floors in classrooms and corridors—they support heavier than ordinary loads without danger of crushing.

**IT'S LONG LASTING . . .** PC Foamglas is noncombustible, odorless and verminproof. It has exceptionally high resistance to moisture, vapor, acid atmospheres and other destructive elements. These are some of the reasons why—when properly installed—PC Foamglas *retains* its original insulating efficiency.

When next you face the problem of selecting an insulating material, be sure you have the latest information on PC Foamglas. The most frequent uses of PC Foamglas are described and illustrated in our current booklets. Our insulating specialists will be glad to call on you upon request to discuss your individual needs. Just write to Pittsburgh Corning Corporation, Dept. C-0, 307 Fourth Avenue, Pittsburgh 22, Pa.



In this core wall the strong, rigid Foamglas blocks become an integral part of the wall, support their own weight and stay in place. Since Foamglas has exceptionally high resistance to many destructive elements, it is widely known as the long life insulating material.



This is  
**FOAMGLAS®**

The entire strong, rigid block is composed of millions of sealed glass bubbles which contain still air. They form a continuous structure, that has unusually high resistance to moisture, vapor, acid atmospheres and other destructive elements. This is the secret of the material's long life insulating efficiency.

FOR ADDITIONAL INFORMATION SEE OUR INSERTS IN SWEET'S CATALOGS . . . when you insulate with **FOAMGLAS . . .**  
the insulation lasts!

0-603



THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# THE BARRETT DIVISION

ALLIED CHEMICAL & DYE CORPORATION

40 Rector Street, New York 6, N. Y.

205 W. Wacker Drive  
Chicago 6, Ill.

36th & Gray's Ferry Avenue  
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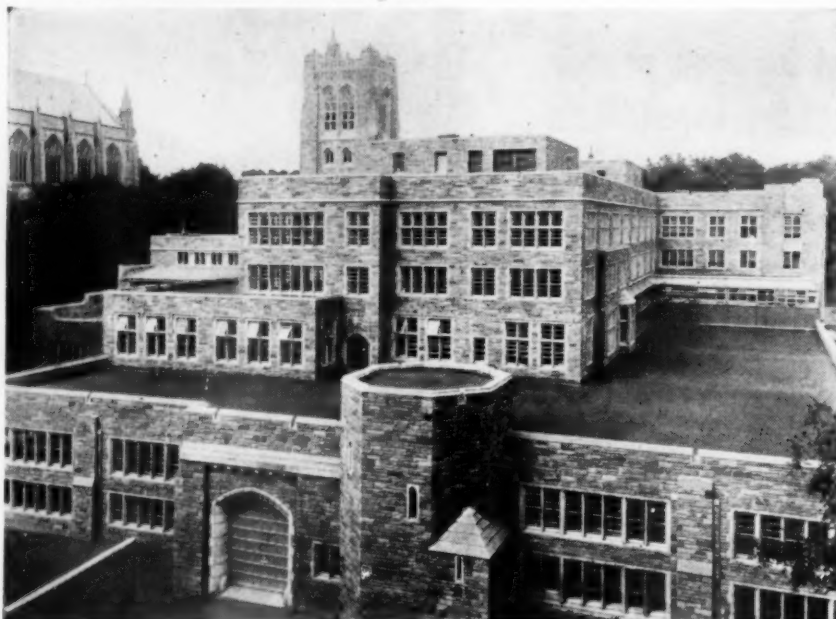
## PRODUCTS

**ROOFING MATERIALS: FOR FLAT SURFACES.** Barrett Specification\* pitch and felt roofs, Black Diamond\* pitch and felt roofs with slag or gravel surfacing. Tarred and Asphalt Saturated Felts and Fabrics, Protective Products, etc.

**FOR STEEP SURFACES.** Barrett\* Steep Roof Pitch and Felt Roofs to receive slag surfacing, Anchor\* Asphalts and S.I.S.\* Roofing, Barrett\* Asphalt Shingles and Roll Roofings.

**OTHER BUILDING MATERIALS:** Waterproofing for foundations, swimming pools, tunnels, floors, etc., special specifications submitted. Roof Coatings and Cements for general roof repair and maintenance—Protective Paints. Rock Wool Insulation, Building Papers for sheathing, lining, etc. Foundation Damp-proofing and Plaster Bond Coatings, Wood Preservatives. Roof Drain and Vent Connections.

**PAVING MATERIALS:** Barrett Tarvia-lithic\* Bituminous Concrete for playground surfacing, roadways, paths and tennis courts. For complete information about these and other products, write the Barrett office nearest you.



Harvey S. Firestone Library, Princeton, N. J. 56,400 square feet of Barrett Specification\* roofs, bonded for 20 years.

### BARRETT PROVIDES THE ROOF

The regularity with which Barrett\* roofs are selected for America's foremost educational buildings is convincing evidence of the superior value provided by these famous roofs. They're not only the toughest, longest-lasting built-up roofs that money can buy, but they also take Fire Underwriters' Class "A" rating—a fact of obvious importance to school boards and parents of school children. \*Reg. U. S. Pat. Off.



Barrett Specification\* roofs are applied by Barrett Approved Roofers according to rigid Barrett specifications developed through years of successful roofing experience.



They are built up of alternate layers of finest grade coal-tar pitch and felt. Barrett\* pitch, the *life-blood* of the roof, is impervious to water and unexcelled as a waterproofing agent.



Top quality felt of Barrett's own manufacture holds the pitch in place and permits the use of greater quantities of this waterproofing material than would otherwise be possible.



Final steps are a triple-thick coating of pitch—*poured*, not mopped—plus an armored surface of gravel or slag. Result is a roof that takes Fire Underwriters' Class "A" rating—a roof so good it can be bonded for 20 years.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51





# THE TEXAS COMPANY

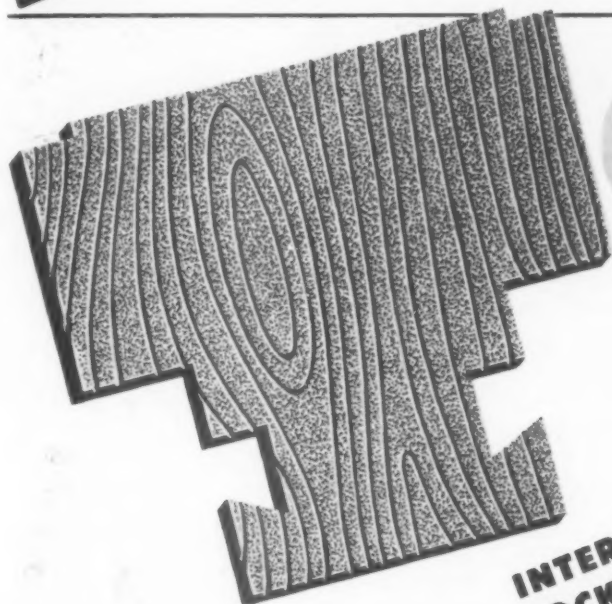
Manufacturers of

**TEXACO ASPHALT SHINGLES and ROOFING**  
**TEXACO SOLID ROOFING ASPHALT**



***NOW!***

a time-tested, top-performing shingle for  
 economical school and university use!



**TEX-LOK**

**DOUBLE  
 COVERAGE!**

**HEAVY  
 DUTY!**

**INTER-  
 LOCKING!**



**BUILT FOR HIGH WINDS AND HEAVY WEATHER!** Each shingle is locked fast to each adjacent shingle. Two tough, interlocking layers over the entire roof area. Time-tested, scientific design for rugged wear in exposed, high-wind areas.

**SELF-LOCKING AND NAILED DOWN TO STAY PUT!** Each shingle is interlocked and firmly anchored with concealed nailing at four points.

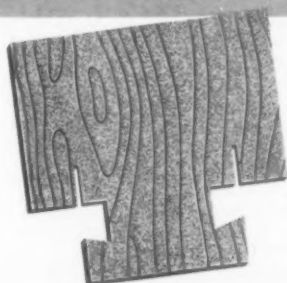
**DISTINCTIVE BASKET WEAVE PATTERN-PLEASING SHADOW LINES!** Vertical as well as horizontal shadows plus rich color blends.

**FIRE RESISTANT!** Of course! Every bundle carries the Underwriters' Laboratory Class "C" Label.

**ECONOMICAL!** Self-aligning, interlocking, and long-lasting. The biggest asphalt shingle value on the market today!

☆ ☆ ☆

**NOTE:** TEX-LOK Shingles are available in the areas currently served from Texaco's roofing plants at Lockport, Illinois and Port Neches, Texas. Texaco ROOFING Dealers everywhere, East of the Rockies. The Texas Company, Division Offices: Atlanta, Ga., Chicago, Ill., Dallas, Texas, Denver, Colo., Houston, Texas, Indianapolis, Ind., Minneapolis, Minn., New Orleans, La., New York, N. Y., Norfolk, Va.



**and TEX-LATCH**

Heavy duty, double coverage and interlocking — similar to TEX-LOK but slightly different in method of locking tabs. Available in the areas served from the Edgemoor, Delaware roofing plant.



MEMBER OF THE  
 ASPHALT ROOFING INDUSTRY BUREAU

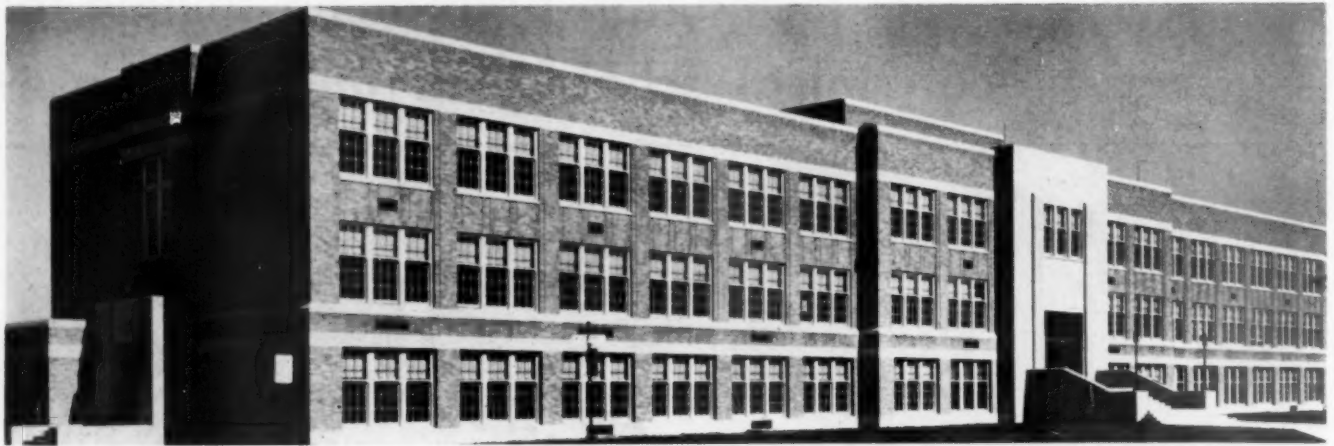
# SMOOTH CEILINGS SYSTEM

(U. S. Patents Nos. 1,950,422 and 2,000,543)

802 Metropolitan Life Building

Minneapolis 1, Minn.

Representatives in Principal Cities



## A FLAT BEAMLESS UNIVERSAL FLOOR CONSTRUCTION FOR SCHOOL BUILDINGS

Adapted to Reinforced Concrete and Structural Steel Designs  
by the Modern Method — Elastic Analysis

**GENERAL DESCRIPTION**—The "Smooth Ceilings" System is normally designed as a 2-way flat slab in accordance with standard building code requirements using the modern method of elastic analysis. The steel column heads or grillages are embedded in the slabs. No concrete caps are required on the columns. The columns may be reinforced concrete, structural steel, steel pipe or cast iron. The floor slabs may be of solid concrete or have light weight blocks or tile fillers embedded in them to reduce dead load and improve plaster bond. Slabs may be built with 2-way joists and removable pans. This system has been used in many important buildings by discriminating architects since 1931. Its practical advantages have been demonstrated in the principal construction centers.

**ADAPTABILITY**—Because of modern, scientific design methods, the construction is adaptable to irregular column spacing, commonly required in school buildings. It has been successfully used in school and university buildings, with resulting economies in first cost and maintenance.

**SERVICES**—We license the use of our system by others. We furnish preliminary estimates including quantities of steel and concrete. We suggest suitable framing layouts. We quote delivered prices for steel column heads required. Our engineers are at your service, ready to co-operate. Any qualified structural engineer can design the system.



OHIO STATE UNIVERSITY addition to Library Building. Smooth Ceiling System selected for its many building advantages over ordinary flat slab construction.



Note the absence of flared column capitals and beams. The clear smooth ceiling expanse provides excellent lighting conditions in the new modern SOUTHWEST HIGH SCHOOL, MINNEAPOLIS, MINN.

## OUTSTANDING ADVANTAGES AND ECONOMIES

**Adequate Strength**—Load tests on "Smooth Ceiling" Systems show very small deflections, good recovery and low stresses in the concrete and steel. Tested and Approved by Board of Standards and Appeals, New York City and others.

**FLEXIBILITY OF SLAB DESIGN**—Floor slab may be solid concrete or cellular with light weight fillers. Ceilings may be smooth or coffered to suit design requirements. Plaster may be applied directly to the concrete ceiling with or without bond coat, depending on conditions, with resultant cost reduction.

**SAVES IN HEIGHT OF BUILDING**—The full clear height between floor and flat ceiling may be utilized with usually a saving of several inches in each story height, aggregating several feet in the total height of the average building. Not only are construction costs reduced but operating costs are minimized.

**FORMING COSTS REDUCED**—The flat deck forms require a minimum amount of cutting and fitting. Therefore the cost of forms for concrete is very low and form lumber salvage exceptionally high.

**COST OF AIR CONDITIONING INSTALLATIONS REDUCED**—Overhead air conditioning duct work is simply and economically installed. The duct work can be run at will on the flat ceilings. No beams, etc., to dodge. Less height is required.

**UNPLASTERED CEILINGS**—Where smooth forming materials are used solid concrete ceilings may be acceptably finished and decorated without plaster, a further cost reduction.

**SMALLER COLUMN FURRING REQUIRED**—Due to design of steel column heads small ducts and pipes can pass through slab close to column shaft.

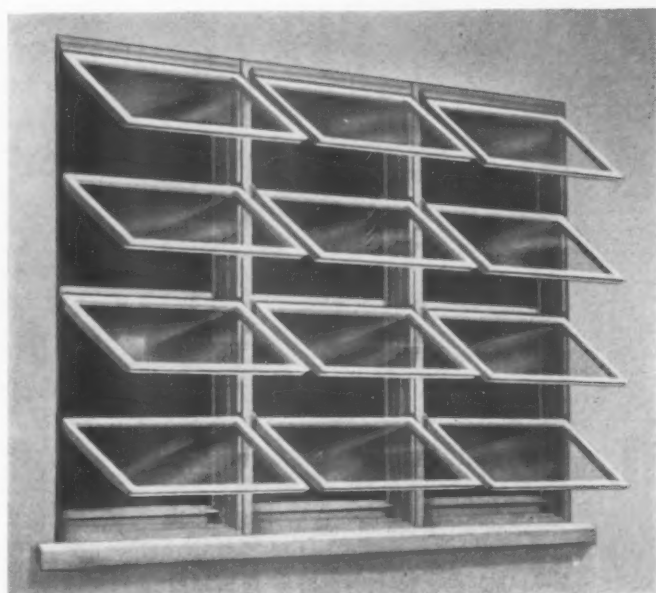
**LOW PLASTERING AND DECORATING COSTS**—Because of the complete elimination of beams, girders, drop panels and flared column caps, plastering, decorating and finishing costs are materially reduced both in time and material.

**IDEAL LIGHTING CONDITIONS**—Since there are no interrupting beams, girders, drop panels, etc., the smooth ceiling expanse assures maximum reflectivity, fewer lighting fixtures and less current consumption.

**ACOUSTICS IMPROVED**—The all flat ceilings are ideal and economical for acoustic treatment.

# GATE CITY SASH AND DOOR CO.

Ft. Lauderdale, Florida



## Gate City WOOD AWNING WINDOWS

**Proved by 10 years  
of satisfactory performance  
in all climates**

**Toxic-treated  
for a lifetime of service**

Providing draft-free ventilation over the entire window area, Gate City Awning Windows offer the most satisfactory type of institutional fenestration—in toxic-treated wood, universally known for architectural beauty, solidity of construction, insulating qualities, long life and economy.

**Warm Weather Comfort:**—Refreshing circulation under adverse conditions . . . safe rainy day ventilation.

**Cold Weather Protection:**—Wood resists destructive moisture condensation due to freezing and thawing . . . protects against damage to interior trim. Horizontal weatherstripping and, if desired, double glazing, completely winterize the unit.

**Accessible Mechanism:**—Virtually unnoticeable, yet instantly available for oiling, inspection, etc.

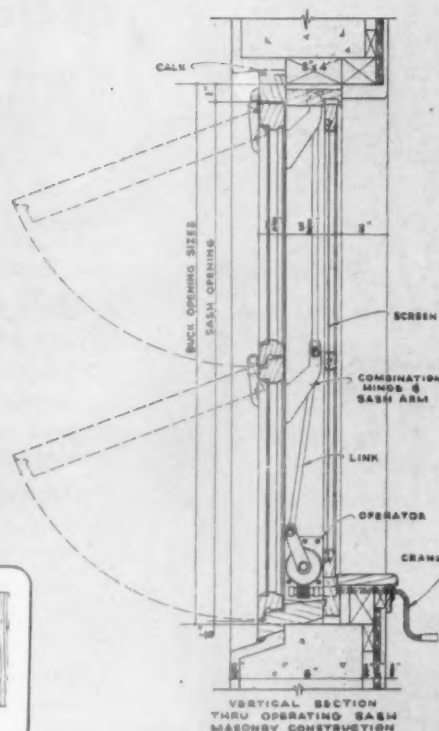
**Sturdy Construction:**—Meets strictest requirements of rigidity and structural strength. No rattling or fluttering.

**No Corrosion Problems:**—No ill effects from moisture, nor from proximity to cement, mortar or plaster.

**Toxic-Treated:**—Factory applied treatment provides water repellence, resistance to rot, fungus, termites — assures long, trouble-free service.

### NEW MAINTENANCE HINGE

Top sash drops to permit cleaning or painting from indoors.



VERTICAL SECTION  
THRU OPERATING SASH  
MASONRY CONSTRUCTION

These beautiful, easy to operate windows are available in a wide range of sizes. For full details, see Sweet's or write direct, addressing Dept. ASU.

Sturdy wood construction with horizontal members rabbeted for weathertightness. Horizontal weatherstripping easily tacked on during installation. Note simplicity of hardware and operating mechanism. Extension crank arm available for windows above reach. All windows prefabricated at our factory.



# STERLING WINDOWS, INC.

369 Lexington Avenue, New York 17, N. Y.

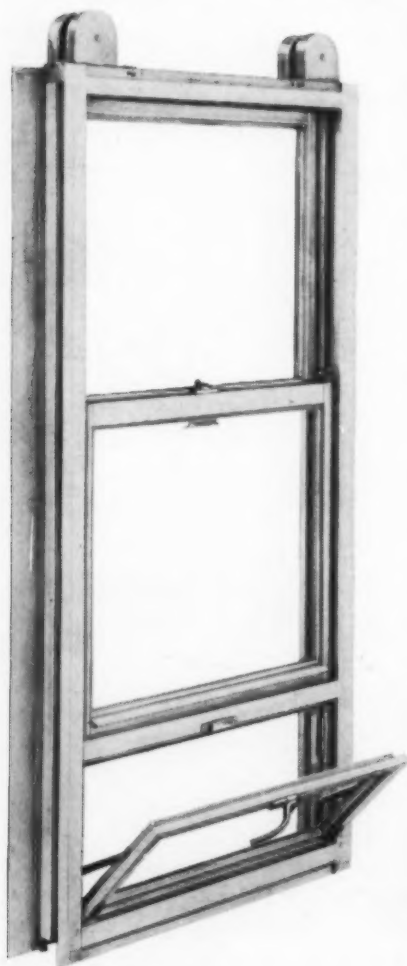
Factory: New Castle, Ind.



Veterinary Bldg., Univ. of Cal., Berkeley, Cal. Blanchard and Maher, Archs.

## Modern Aluminum Windows Now Offer New Controlled Ventilation

### Exclusive Sterling Built-in Hopper Vent Now Available for New Schools



Designed especially for schools and hospitals that vitally need the best in controlled ventilation, Sterling Windows of easy-to-operate double-hung construction are now available with this new built-in Hopper Vent feature.

- **More Light**... Sterling's exclusive mullion design permits greater glass area.
- **Permanence**... Sterling windows are made entirely of corrosion resisting aluminum.
- **Operating ease**... no sticking, binding, or rattling with spring cushion weatherstripping.
- **Maintenance**... no painting, no rusting, no dripping strains to mar walls.
- **Tested**... meet rigid high standards of independent Pittsburgh Testing Laboratory and bear Quality Seal of the Aluminum Window Manufacturers Association.
- **WRITE**... for name of nearest agent in principal cities, for complete details and services of Sterling's engineering department. See our catalog in Sweet's File, Arch.

#### Typical Sterling Installations

PUBLIC SCHOOL #133, NEW YORK CITY  
UNIV. OF TENN., DAIRY BLDG.,  
KNOXVILLE, TENN.  
VOCATIONAL H. S., KINGSTON, N. Y.  
UNIV. OF CAL., FORESTRY BLDG.,  
BERKELEY, CAL.  
HIGH SCHOOL, GLEN BURNIE, MD.  
UNIV. OF WIS., ENZYME LAB.,  
MADISON, WIS.  
ELEMENTARY SCHOOL, CLOVIS, N. M.  
STATE TEACHERS COLLEGE, GENESEO, N. Y.  
WILSON & HARDING SCHOOLS,  
HAMMOND, IND.  
BURBANK SCHOOL, HOUSTON, TEXAS  
SEDGWICK SCHOOL, PHILADELPHIA, PA.  
DOLAN HIGH SCHOOL, STAMFORD, CONN.





# Adlake

## ALUMINUM double hung WINDOWS

**... pay for themselves in a few short years!** Installation after installation proves it! ADLAKE Aluminum Windows actually *pay for themselves* by eliminating all maintenance costs except routine washing! And they will last as long as the building they enhance!

Only ADLAKE Windows have the combination

of woven-pile weather stripping and patented serrated guides that assures minimum air infiltration and absolute finger-tip action.

For full information on ADLAKE Windows, write for Detail and Specification Catalog. Address The Adams & Westlake Company, 1122 N. Michigan, Elkhart, Indiana. No obligation, of course.

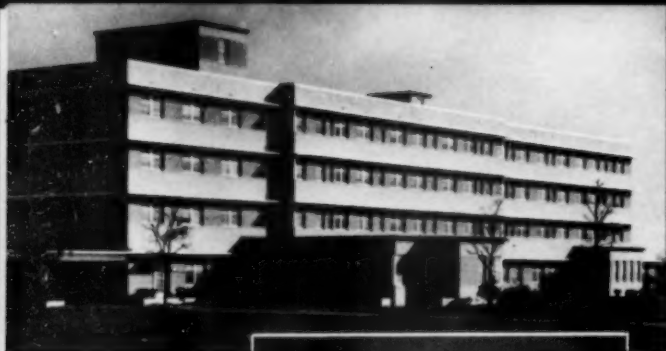
### ONLY ADLAKE ALUMINUM WINDOWS GIVE YOU ALL THESE "Plus" FEATURES

- Minimum Air Infiltration • No Warp, Rot, Rattle, Stick • Ease of Installation
- Finger-Tip Action • No Painting or Maintenance



every Adlake window ...

... carries this seal of quality



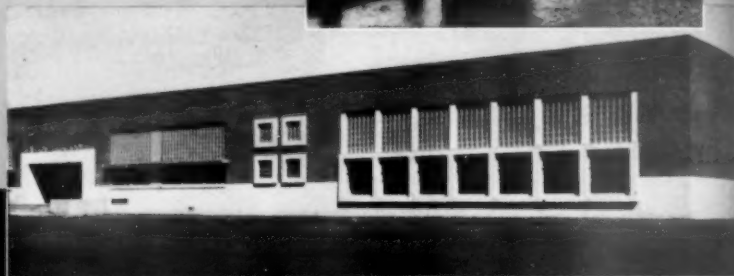
Baptist Hospital,  
Beaumont, Texas  
Architect:  
Wyatt C. Hedrich, Dallas  
Contractor:  
R. P. Farnsworth Co., Inc.,  
Houston



Plains Grade School,  
Plains, Texas  
Architects:  
Barry, Kerr & Kerr, Amarillo  
Contractor: W. D. Light, Plains



McKinley School, South Bend, Ind.  
Architects: Maurer & Maurer,  
South Bend  
Contractor: Sollitt Construction Co.,  
South Bend



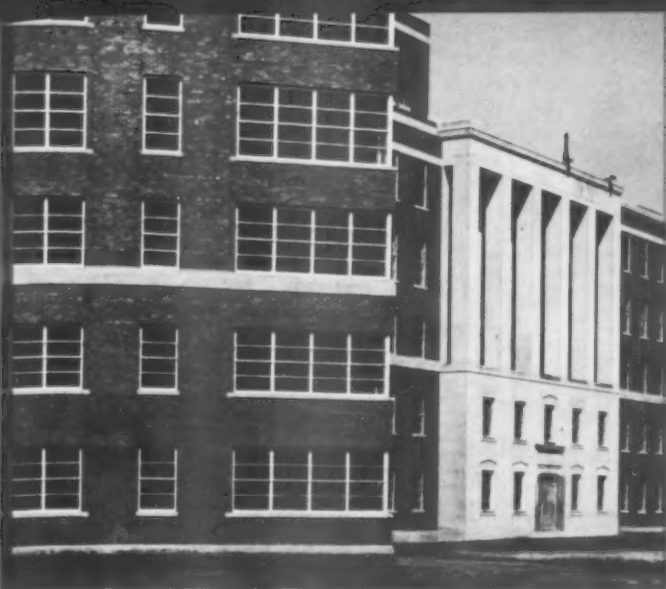
## THESE INSTITUTIONS ARE SAVING MONEY WITH ADLAKE ALUMINUM WINDOWS!

Barrington High School,  
Barrington, Illinois  
Architects: Perkins and Will  
Contractor: Coath & Goss



Georgia Baptist Hospital, Atlanta, Ga.  
Architects: Stevens and Wilkinson, Inc.  
Contractor: Henry C. Beck Company

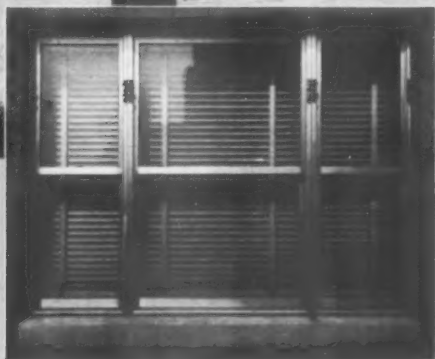




University of Michigan,  
Ann Arbor, Mich.  
Architects:  
Harley, Ellington & Day  
Contractor: Bryant & Detwiler



Helen Rivas Clinic, Rochester, New York  
Architects: Kaelber & Waasdorp  
Contractor: A. W. Hopeman & Sons



Edward S. Harkness Memorial  
Hospital, New York City  
Architects: Voorhes, Walker,  
Foley & Smith  
Contractor: Vermilya-Brown



Pratt Diagnostic Hospital,  
Boston, Mass.  
Architects: Reinhardt-Hofmeister  
& Walquist, N. Y.  
Contractor: Barr & Lane, Boston

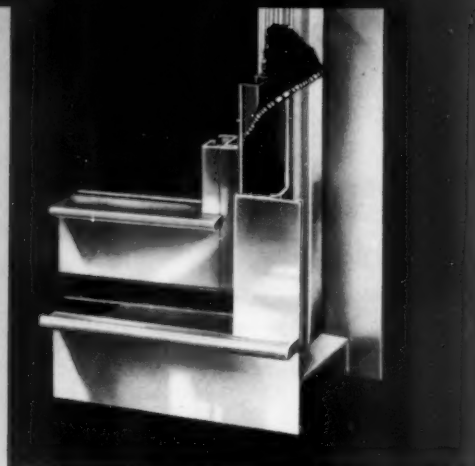


Bishop Noll High School,  
Hammond, Indiana  
Architect: William S. Hutton,  
Hammond  
Contractor: John F. Rahn, Inc.,  
East Chicago

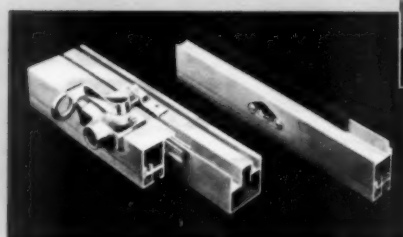
# ADLAKE

## WEATHER STRIP and HARDWARE

ALL ADLAKE Windows are completely double weather-stripped with a high-pile woven fabric which is highly impervious to the elements. This type of weather strip has been used very successfully by The Adams & Westlake Company for many years in the transportation industry, where air infiltration is extremely important. Its employment eliminates the costly gouging and scraping often found where metal-to-metal contact weather strip is used. Used in conjunction with patented serrated guides, this high-pile weather strip imparts to ADLAKE Double Hung Windows that weathertightness, finger-tip control and noiseless operation which is synonymous with quality fenestration.



(Right) No. 102 Lock—Standard on all windows using DSA-3/8" or 1/4" plate glass



(Left) No. 1508 Pole Operated Lock

(Right) No. 564 Pole Socket—Used where window height requires window pole

### PARTIAL LIST OF INSTALLATIONS

#### SCHOOLS

LABORATORY OF NUCLEAR STUDIES  
Ithaca, N. Y.

McKINLEY ELEMENTARY SCHOOL  
South Bend, Ind.

COLERAIR TWP. SCHOOLS  
Cincinnati, Ohio

HOLY CHILDHOOD PARISH  
St. Paul, Minn.

RES. HALL, WESTERN STATE  
TEACHERS COLLEGE  
Bowling Green, Ky.

SCIENCE BLDG., CENTENARY  
Shreveport, La.

SCHOOL OF NURSING  
Oklahoma City, Okla.

L'OUVERTURE SCHOOL  
St. Louis, Mo.

SCHOOL OF BUSINESS ADMINIS-  
TRATION, Detroit, Mich.

COLUMBIA UNIVERSITY  
New York, New York

RES. HALL FOR WOMEN  
Ypsilanti, Mich.

INDIANAPOLIS PUBLIC SCHOOL  
Indianapolis, Ind.

TOLLESTON SCHOOL  
Gary, Ind.

FACULTY RESIDENCE, DE ANDRIES  
St. Louis, Mo.

BOTANY & ZOOLOGY BLDG.  
Columbus, Ohio

LIBRARY—A & I COLLEGE  
Nashville, Tenn.

ELECTRICAL ENGINEERING BLDG.  
Lincoln, Nebr.

NEW TRIER HIGH SCHOOL  
Winnetka, Ill.

BARRINGTON HIGH SCHOOL  
Barrington, Ill.

WOODLAWN SCHOOL  
Columbus, Georgia

FENN COLLEGE  
Cleveland, Ohio

RICHMOND BURTON HIGH SCHOOL  
Richmond, Illinois

GRANT COMMUNITY HIGH SCHOOL  
Fox Lake, Illinois

ST. EULALIA PARISH  
Maywood, Illinois

EDISON SCHOOL  
Gary, Indiana

PREAKNESS JR. HIGH SCHOOL  
Preakness, N. J.

DAYTON STREET SCHOOL  
Newark, N. J.

AMELIA HIGH SCHOOL  
Amelia, Ohio

BRICK CHURCH SCHOOL  
New York, N. Y.

25TH & VIRGINIA ST. SCHOOL  
Gary, Indiana

MEN'S DORMITORY EAST CAROLINA  
TEACHERS COLLEGE  
Greenville, N. C.

HOMWOOD SCHOOL  
Homewood, Illinois

ELGIN GRADE SCHOOL  
Elgin, Illinois

SMITH HALL—PURDUE UNIVERSITY  
West Lafayette, Ind.

CHANTILLY ELEMENTARY SCHOOL  
Charlotte, N. C.

ST. LUKE'S SCHOOL  
St. Louis, Missouri

WILSON HIGH SCHOOL  
Wilson, Texas

COURTLAND STATE TEACHERS  
SCHOOL, Courtland, N. Y.

CENTRAL STEGER SCHOOL  
Steger, Illinois

ROCKY RIVER HIGH SCHOOL  
Cleveland, Ohio

EAST BRUNSWICK SCHOOL  
East Brunswick, N. Y.

ST. DOROTHY'S SCHOOL  
Drexel Hill, Pennsylvania

NAZARETH ACADEMY  
La Grange, Illinois

VALLEY ROAD ELEMENTARY  
SCHOOL, Princeton, N. J.

ROSELAWN ELEMENTARY SCHOOL  
Cincinnati, Ohio

EVANSVILLE COLLEGE  
Evansville, Indiana

GARFIELD SCHOOL  
Port Huron, Michigan

SOUTH AVONDALE SCHOOL  
Cincinnati, Ohio

ST. BERNARD'S SCHOOL  
Omaha, Nebraska

NEW HAMILTON ELEMENTARY  
SCHOOL, Mt. Vernon, N. Y.

PLEASANTDALE SCHOOL  
West Orange, N. J.

NEW LENOX SCHOOL  
New Lenox, Illinois

LAURELTON SCHOOL  
Irondequoit, N. Y.

STATE TEACHERS COLLEGE  
Brockport, N. Y.

ELEMENTARY SCHOOL  
Lafayette, Indiana

EDGAR SCHOOL  
Metuchen, N. J.

PULASKI SCHOOL  
Gary, Indiana

MEN'S DORMITORY, UNIVERSITY OF  
MICHIGAN, Ann Arbor, Mich.

BETHPAGE ELEMENTARY SCHOOL  
Bethpage, L. I., New York

GIRLS' CENTRAL HIGH SCHOOL  
Butte, Montana

THE ADAMS & WESTLAKE COMPANY • ELKHART, INDIANA

Established 1857

New York • Chicago



# Lupton Metal Windows in Schools Throughout America



McKinley Grade School, Coffeyville, Kan. Architect: Thomas W. Williamson & Co., Topeka, Kan. Contractor: Charles Bennett Construction Co., Coffeyville, Kan.

In classrooms . . . in auditoriums . . . in gymnasiums—in hundreds of schools, large and small, Lupton Metal Windows mean added comfort and visibility and low maintenance costs.

Check these advantages of Lupton Metal Windows:

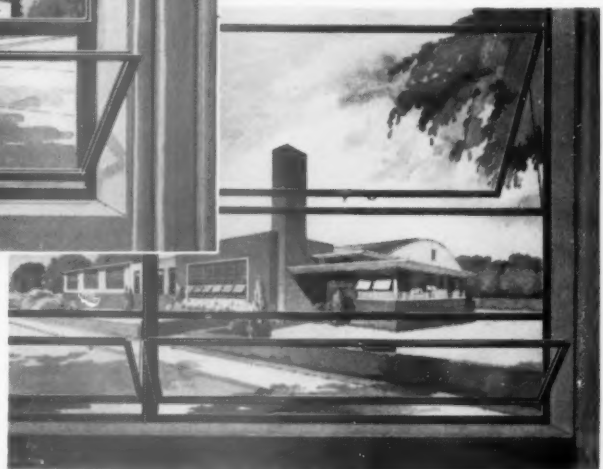
- 1) Abundant non-glare daylight—clear, effortless vision in every corner of rooms. As a method of window design, metal windows admit more daylight than any other type of daylight opening.
- 2) Controlled, healthful ventilation—air flow easily controlled to supply exactly the right amount of ventilation.
- 3) Weathertight, yet easy to operate—sturdy metal frames will not warp, swell, or stick.
- 4) Initial cost and maintenance is surprisingly low.

We illustrate two types of windows in this folder, the Lupton Architectural Projected Window in steel and the new Lupton "Master" Aluminum Window which was specially designed for school buildings.

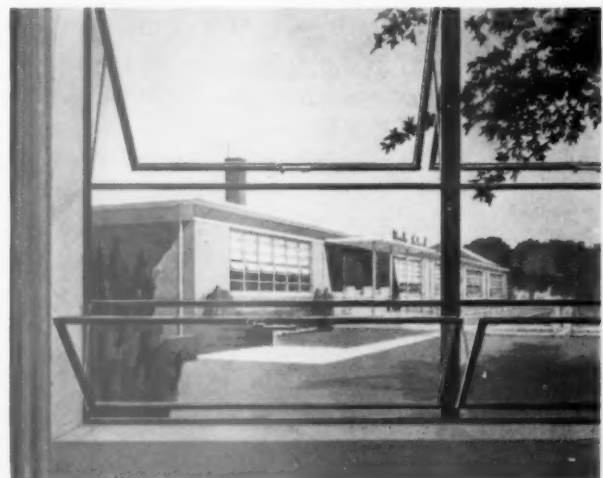
Both steel and aluminum windows are of the same general design having horizontally opening projected ventilators.

The projected type of window offers several advantages. Open-out ventilators shield the opening, permitting ventilation in rainy weather. They do not obstruct aisle space along the wall and do not interfere with shades or blinds. Open-in ventilators at sill prevent direct drafts and also shield the opening. This ventilator arrangement permits cleaning both sides of glass from within the building.

Standard bronze wire screens are available, and can be attached from the inside.



Immaculata High School, Birmingham, Ala. Director: Rev. E. J. Lawler. Architect: Wilmont C. Douglas, Birmingham. Contractor: Daniel Construction Co., Greenville, S. C.



Ranlo Elementary School, Ranlo, N. C. Architect: R. L. Clemmer, Hickory, N. C. Contractor: E. R. Morgan, Gastonia, N. C.

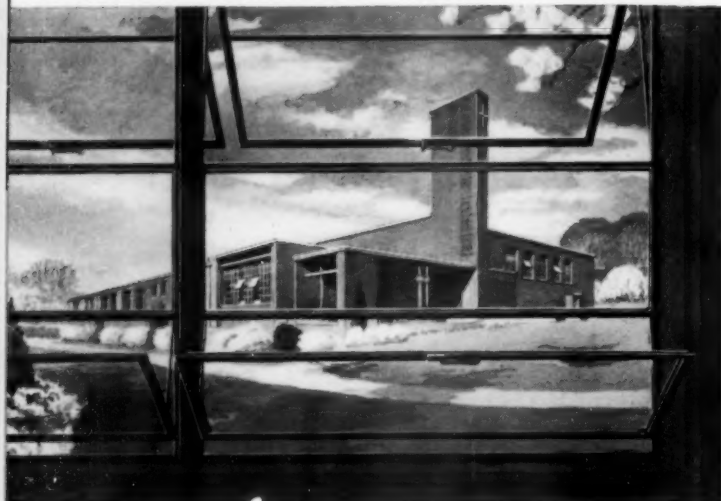
## MICHAEL FLYNN MANUFACTURING CO.

(MEMBER METAL WINDOW INSTITUTE)

714 East Godfrey Avenue, Philadelphia 14, Pa. Manufacturers of Metal Windows and Doors



# LUPTON Architectural Projected Windows (Steel)



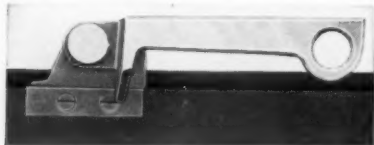
St. Joan of Arc Parochial School, Hershey, Pa. Architect: Bernard E. Starr, Harrisburg, Pa. Contractor: Shelley-Spera Construction Co., Inc., Harrisburg, Pa.



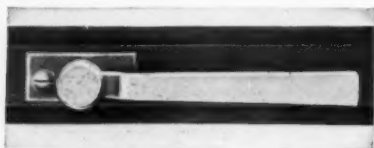
St. Stanislaus School, Lansdale, Pa. Architect: J. C. Berret, Lansdale, Pa. Builder: Henry J. Kauffie, Lansdale, Pa.

## HARDWARE

Hardware for steel Architectural Projected Windows is solid bronze with smooth mat finish. For Master Aluminum Windows, hardware is aluminum with clear lacquered finish.



Locking Handle with strike plate for open-out ventilators.



Locking Handle with concealed latch for open-in ventilators within reach from floor.

Ring type spring catch (not illustrated) is used where open-in ventilators are beyond reach from floor.

Over a period of many years Lupton Architectural Projected Windows have served in the nation's schools, bringing better vision and healthful ventilation to thousands of students, with minimum expenditure for installation and maintenance.

Today Lupton Architectural Projected Windows have improved weathering and hardware redesigned for modern appearance and better performance.

## Specification — Steel Architectural Projected Windows

**MATERIALS**—Frame and ventilator members shall be hot rolled from new billet steel and shall be specifically designed for the manufacture of projected windows. Frame members shall be an unequal leg channel section not less than 1 3/4" deep. Ventilator members shall have a minimum depth of 1 1/2". Weight of section through frame and ventilator shall be not less than 3.4 lbs. per lineal foot. Muntins shall be 1 3/8" deep.

**GLAZING PROVISION**—Windows shall be designed for outside putty glazing, using spring wire glazing clips.

**CONSTRUCTION**—Corners of frames and ventilators shall be tenoned and air-hammer riveted. In addition, all four corners of all ventilators shall be welded. Welds shall be dressed flush on exposed and contact surfaces.

Ventilators shall open in at top or out at bottom, as shown on elevations. Each ventilator shall be balanced on two steel arms and shall have two bronze friction shoes with steel springs. The arms shall be attached to ventilators and ventilator frames by brass pivot pins with bronze washers. Springs shall be adjusted to give smooth operation and also to hold the ventilators firmly within the limits of opening.

Ventilators shall be adjusted at the factory to make continuous weathering contact on all sides when closed.

**MULLIONS**—When indicated on drawings, vertical steel mullions, mullion covers and bolts and clips for attaching shall be furnished—plate type mullions for openings up to 8'-0" high—hot rolled T-bars for over 8 feet. Covers shall be snap-on type, completely concealing mullion bolts and clips on inside.

**ANCHOR CLIPS** shall be furnished where indicated on details.

**HARDWARE (Standard)**—All locking handles, pull rings and spring catches shall be solid bronze with smooth mat finish.

Open-out ventilators shall have pull rings and cam action locking handles with bronze strike plates.

Open-in ventilators shall have cam action locking handles with concealed latch or, where tops of ventilators are over 5'-6" from floor, ring-type spring catches for operation by pole. All hardware shall be shipped unattached, carefully packed.

**FACTORY FINISH**—Windows shall be cleaned, Bonderized and painted with one coat of primer at the factory. Paint shall be oven dried.

**SCREENS**—All windows shall be prepared to receive screens. (Screens are furnished at added cost). Furnish wicket-type screens for open-out ventilators, flat type for open-in ventilators. Screens shall have 18x14 mesh bronze wire in metal frames with removable splines.

# The LUPTON "Master" Aluminum Window

The LUPTON "Master" Aluminum Window is designed especially for schools. It sets new standards of durability and low maintenance costs, and offers new opportunities in window planning—better appearance, minimum infiltration and greater adaptability to modern building design.

Here are some of the outstanding construction features:

- 1) **NEW DEEP SECTIONS**—both frames and ventilators are 1½ inches deep—sturdier without sacrificing lightness.
- 2) **PRECISION WEATHERING**—Ventilators fit snug and tight—naturally—without forcing. Full 5/16 inch overlapping contact.
- 3) **SPECIAL HEAT TREATED ALUMINUM ALLOY** used in this new Lupton Window eliminates painting and costly repair and maintenance.
- 4) **STURDY CONSTRUCTION**—Welded ventilator corners—strength where strength is needed.

Lupton "Master" Aluminum Windows can be made for inside or outside glazing. Thermopane or Twin-dow can be installed if desired.

## Specification — Aluminum "Master" Projected Windows

**MATERIALS**—Frame and ventilator members shall be aluminum alloy 63S-T5, extruded in shapes specifically designed for window construction. Frame, ventilator and muntin sections shall be not less than 1½" deep and ½" thick. Frame shall be unequal leg channel that will provide ¾" anchorage at head and jambs. Glazing bars shall have longitudinal grooves or lip for retention of putty.

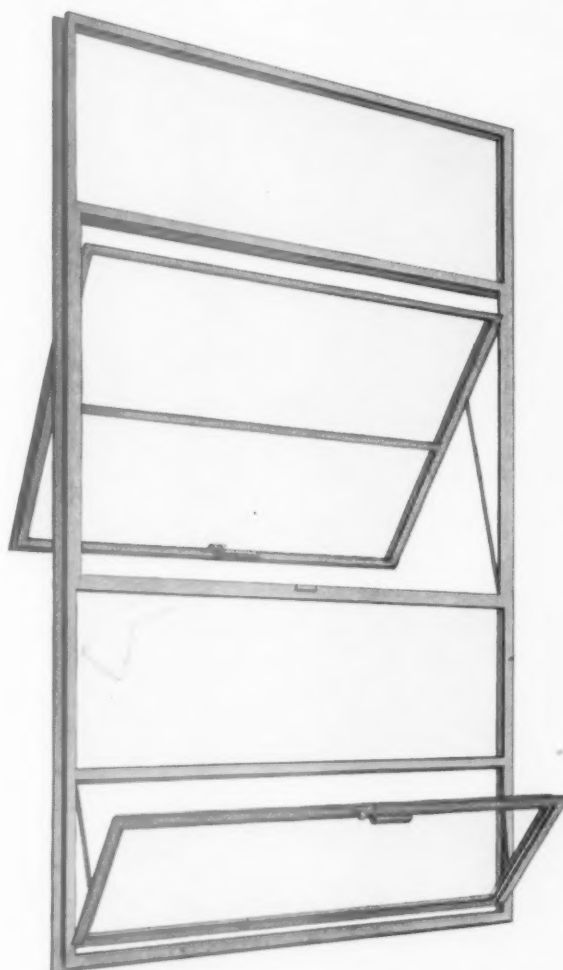
All other parts shall be of aluminum or of material non-reactive with aluminum under normal conditions of service.

**GLAZING PROVISION**—Windows shall be designed for outside putty glazing, using wire clips.

**NOTE**—Outside glazing is standard. If specified, windows will be made for inside putty glazing or for inside glazing with channel glazing bead.

**CONSTRUCTION**—Corners of ventilators shall be flash welded and finished flush on all exposed and contact surfaces. Corners of frames shall be carefully fitted and tightly riveted. Projected ventilators shall open in at top or out at bottom, as indicated on elevations. Each ventilator shall be balanced on two arms of aluminum alloy and shall be equipped with two stainless steel flat springs and two friction shoes of non-abrasive plastic designed to slide in channels at jambs. Springs shall be adjusted at the factory to give smooth operation and to hold ventilator firmly within limit of opening. Continuous, overlapping contact shall be provided inside and outside for entire perimeter of ventilator.

**MULLIONS**—Vertical mullions shall be extruded aluminum special T-bar 2½" deep. Cover shall be aluminum .051" thick.



**ANCHORS**—Clips and bolts shall be cadmium plated steel.

**HARDWARE**—Locking hardware and pull rings shall be aluminum with smooth mat finish, lacquered. Open-out ventilators shall have pull rings and locking handles with aluminum strike plates. Open-in ventilators shall have locking handles with concealed latch or, where tops of ventilators are beyond 5'-6" from the floor, ring type spring catches for pole operation.

All hardware shall be carefully packed for shipping.

**FACTORY FINISH**—Windows and mullions shall be cleaned and lacquered. Outer edges shall be covered for protection during shipment.

**SCREENS**—(Furnished at extra cost.) Screens shall have aluminum frames and 18x14 mesh Alclad wire cloth.





































# LUPTON

## METAL WINDOWS

# STANDARD SIZES and TYPES

## "Master" Projected Windows (400 Series)

## Architectural Windows (200 Series)

WINDOW DIMEN.	1'-8 $\frac{7}{8}$ "	3'-4 $\frac{7}{8}$ "	4'-0 $\frac{7}{8}$ "	5'-0 $\frac{7}{8}$ "
1'-5"	 401 (1.51 <sup>sq</sup> ) 201 (1.59 <sup>sq</sup> )	 411 (3.30 <sup>sq</sup> ) 211 (3.42 <sup>sq</sup> )	 421 (4.01 <sup>sq</sup> ) 221 (4.15 <sup>sq</sup> )	 431-T (5.00 <sup>sq</sup> ) 231-T (5.18 <sup>sq</sup> )
2'-9"	 402 (3.28 <sup>sq</sup> ) 202 (3.42 <sup>sq</sup> )	 412 (7.18 <sup>sq</sup> ) 212 (7.36 <sup>sq</sup> )	 422 (8.72 <sup>sq</sup> ) 222 (8.94 <sup>sq</sup> )	 432-T (10.88 <sup>sq</sup> ) 232-T (11.16 <sup>sq</sup> )
2'-9"	 402-K (3.28 <sup>sq</sup> ) 202-K (3.42 <sup>sq</sup> )	 412-K (7.18 <sup>sq</sup> ) 212-K (7.36 <sup>sq</sup> )	 422-K (8.72 <sup>sq</sup> ) 222-K (8.94 <sup>sq</sup> )	 432-K (10.88 <sup>sq</sup> ) 232-K (11.16 <sup>sq</sup> )
4'-1"	 403 (5.29 <sup>sq</sup> ) 203 (5.44 <sup>sq</sup> )	 413 (11.29 <sup>sq</sup> ) 213 (11.49 <sup>sq</sup> )	 423 (13.67 <sup>sq</sup> ) 223 (13.92 <sup>sq</sup> )	 433-T (16.76 <sup>sq</sup> ) 233-T (17.32 <sup>sq</sup> )
5'-5"	 404 (7.30 <sup>sq</sup> ) 204 (7.46 <sup>sq</sup> )	 414 (15.40 <sup>sq</sup> ) 214 (15.62 <sup>sq</sup> )	 424 (18.62 <sup>sq</sup> ) 224 (18.90 <sup>sq</sup> )	 434-T (22.64 <sup>sq</sup> ) 234-T (23.48 <sup>sq</sup> )
5'-5"	 405 (6.80 <sup>sq</sup> ) 205 (7.03 <sup>sq</sup> )	 415 (14.59 <sup>sq</sup> ) 215 (14.91 <sup>sq</sup> )	 425 (17.68 <sup>sq</sup> ) 225 (18.07 <sup>sq</sup> )	 435-T (21.76 <sup>sq</sup> ) 235-T (22.50 <sup>sq</sup> )
6'-9"	 406 (8.81 <sup>sq</sup> ) 206 (9.05 <sup>sq</sup> )	 416 (18.70 <sup>sq</sup> ) 216 (19.04 <sup>sq</sup> )	 426 (22.63 <sup>sq</sup> ) 226 (23.05 <sup>sq</sup> )	 436-T (27.64 <sup>sq</sup> ) 236-T (28.66 <sup>sq</sup> )
8'-1"	 408-K (10.08 <sup>sq</sup> ) 208-K (10.45 <sup>sq</sup> )	 418-K (21.77 <sup>sq</sup> ) 218-K (22.27 <sup>sq</sup> )	 428-K (26.40 <sup>sq</sup> ) 228-K (27.01 <sup>sq</sup> )	 438-K (32.64 <sup>sq</sup> ) 238-K (33.66 <sup>sq</sup> )
9'-5"	 410 (12.09 <sup>sq</sup> ) 210 (12.47 <sup>sq</sup> )	 420 (25.88 <sup>sq</sup> ) 220 (26.40 <sup>sq</sup> )	 430 (31.35 <sup>sq</sup> ) 230 (31.99 <sup>sq</sup> )	 440-T (38.52 <sup>sq</sup> ) 240-T (39.82 <sup>sq</sup> )

Exposed Glass Areas—Shown in sq. ft. Fixed Windows—Available in all sizes shown. Windows are shown as seen from outside. Ventilators shown above as open-out may be made open-in provided that all ventilators in same unit open in.

### Glass Sizes (in inches) for Master Projected Windows (Aluminum)

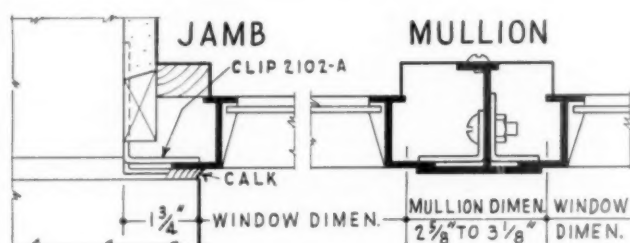
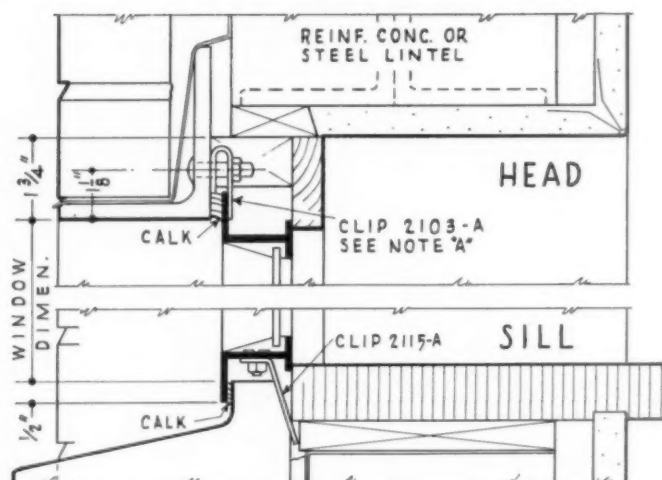
1—17 $\frac{3}{8}$ x 13 $\frac{3}{8}$	7—45 $\frac{3}{8}$ x 14 $\frac{1}{2}$
2—37 $\frac{3}{8}$ x 13 $\frac{3}{8}$	8—28 $\frac{1}{2}$ x 14 $\frac{1}{2}$
3—45 $\frac{3}{8}$ x 13 $\frac{3}{8}$	9—19 $\frac{3}{8}$ x 15 $\frac{3}{8}$
4—28 $\frac{1}{2}$ x 13 $\frac{3}{8}$	10—39 $\frac{3}{8}$ x 15 $\frac{3}{8}$
5—17 $\frac{3}{8}$ x 14 $\frac{1}{2}$	11—47 $\frac{3}{8}$ x 15 $\frac{3}{8}$
6—37 $\frac{3}{8}$ x 14 $\frac{1}{2}$	12—29 $\frac{3}{8}$ x 15 $\frac{3}{8}$

### Glass Sizes (in inches) for Architectural Projected Windows (Steel)

1—17 $\frac{3}{8}$ x 13 $\frac{3}{8}$	7—45 $\frac{3}{8}$ x 14 $\frac{1}{2}$
2—37 $\frac{3}{8}$ x 13 $\frac{3}{8}$	8—28 $\frac{3}{4}$ x 14 $\frac{1}{2}$
3—45 $\frac{3}{8}$ x 13 $\frac{3}{8}$	9—19 $\frac{3}{8}$ x 15 $\frac{3}{8}$
4—28 $\frac{3}{4}$ x 13 $\frac{3}{8}$	10—39 $\frac{3}{8}$ x 15 $\frac{3}{8}$
5—17 $\frac{3}{8}$ x 14 $\frac{1}{2}$	11—47 $\frac{3}{8}$ x 15 $\frac{3}{8}$
6—37 $\frac{3}{8}$ x 14 $\frac{1}{2}$	12—29 $\frac{3}{8}$ x 15 $\frac{3}{8}$

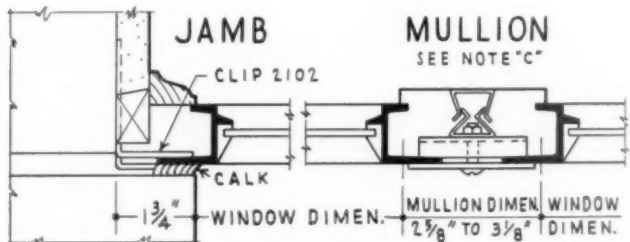
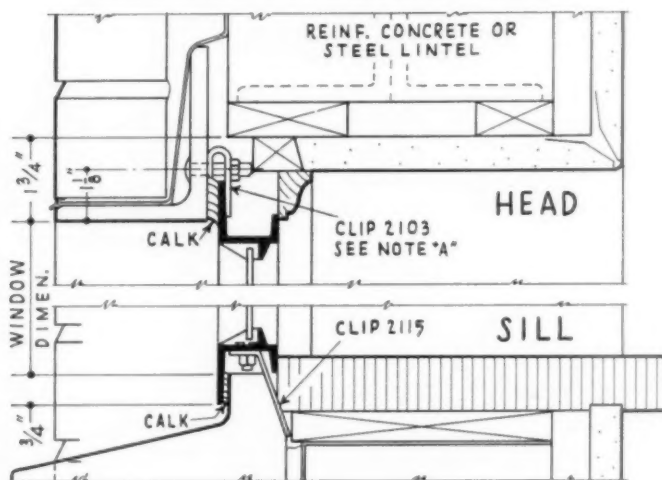
## INSTALLATION DETAIL

### "Master" Projected Windows



## INSTALLATION DETAIL

### Architectural Projected Windows



### NOTES

A — Holes for clips punched by steel contractor  $\frac{3}{8}$ " dia. not over 20" apart. Carriage bolts set by steel contr. before masonry. Clips and bolts furnished by M.F.M.Co.

B — Not by M.F.M.Co.: Mastic, calking, trim, flashing, structural steel, glazing and glazing materials.

C — T-bar mullion furnished for Architectural Projected Windows over 8 ft. high.



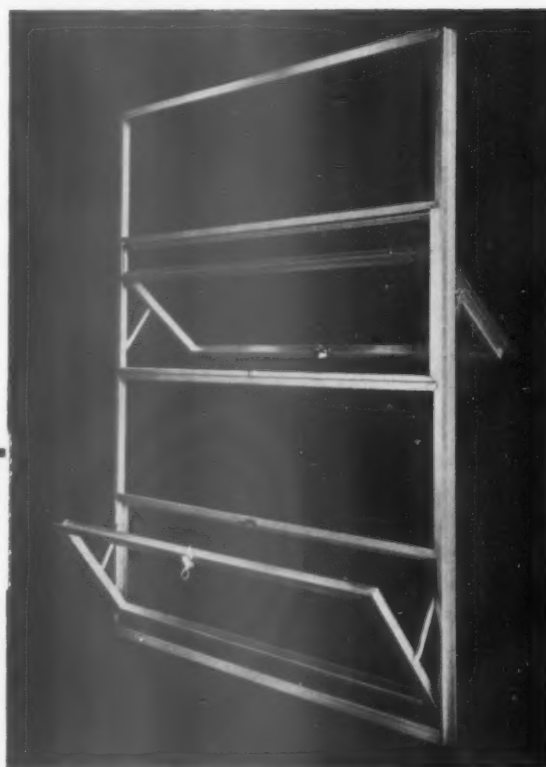
# ALBERT STORMS & CO.

101 Park Avenue, New York 17, N. Y.

Telephone: MURRAY Hill 5-9380

"STORMTITE" Aluminum Windows feature hollow extrusions and welded corners with standard production methods insuring maximum rigidity against wind and stresses. Standardized manufacture makes for economy.

"STORMTITE" Windows have narrow sight lines insuring maximum light, beauty and appearance. They may be equipped with weather stripping, either a resilient compound of cork and rubber or stainless steel.



## "STORMTITE"



## ALUMINUM WINDOWS FEATURING HOLLOW EXTRUSIONS

"STORMTITE" Windows are made in a variety of types as follows:

- |            |   |
|------------|---|
| Series 900 | Casement Protected                      |
| Series 910 | Intermediate Casement Combination       |
| Series 915 | Intermediate Casements                  |
| Series 920 | Casement Doors                          |
| Series 930 | Continuous Sash                         |
| Series 940 | Continuous Fenestration with Sub Frames |
| Series 950 | Windows for Glass Block                 |

Send us your requirements. We will be glad to show you how easy it is to coordinate "STORMTITE" Windows in your building.



THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# THE WILLIAM BAYLEY COMPANY

SPRINGFIELD 99, OHIO  
1200 Warder St.

NEW YORK 17, N.Y.  
Grand Central Terminal

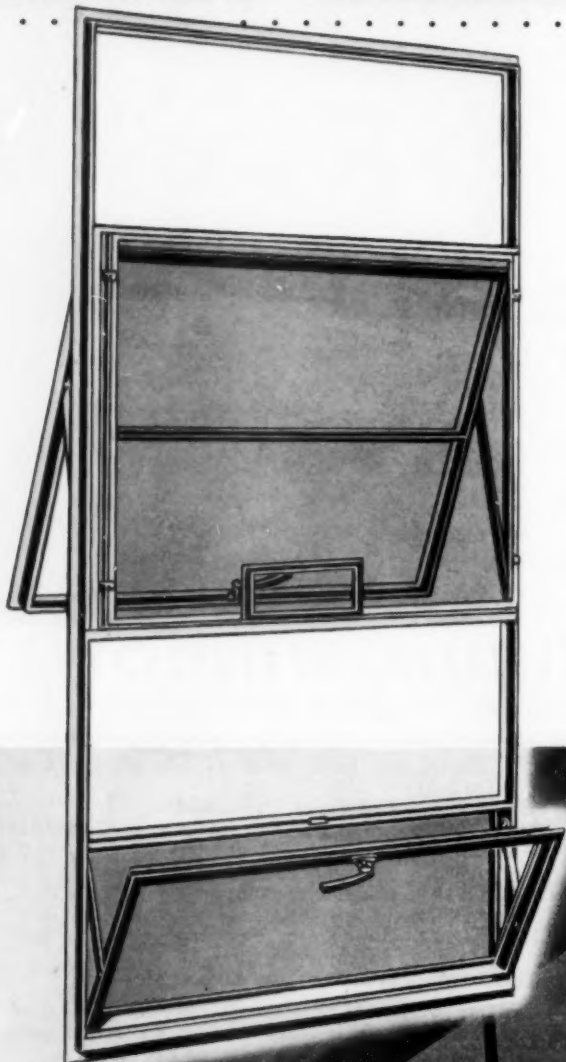
CHICAGO 2, ILL.  
105 W. Madison St.

WASHINGTON 16, D.C.  
3701 Mass. Ave., N.W.

Manufacturers of

Factories: SPRINGFIELD, OHIO

## BAYLEY Aluminum Projected Windows



### SCHOOL WINDOWS

that provide ideal control of  
natural daylight, ventilation, and vision

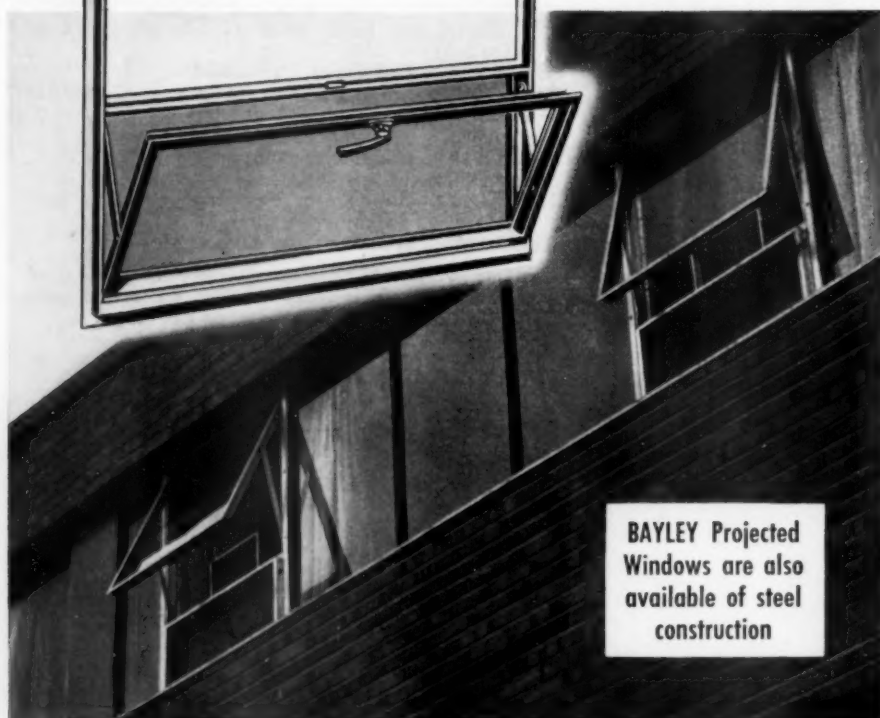
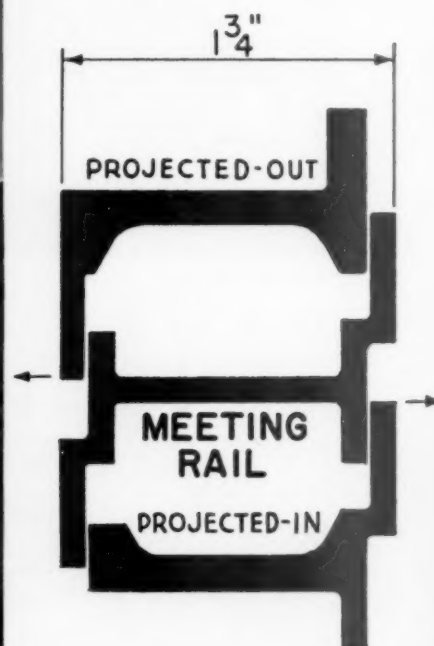
Throughout the nation, Bayley Aluminum Projected Windows have proved time and again to be the right choice for schools of every size and type. They are made of specially extruded, extra-strength aluminum sections. Need no painting. Have no complicated mechanical parts to get out of order. Withstand long years of rugged usage. Simplified design of these windows assures practical utility and pleasing appearance.

#### ADAPTABLE TO ALL TYPES OF ARCHITECTURE

Awning effect of Projected-Out Ventilator combines weather protection and ventilation. Projected-In Ventilator also affords "no-draft" ventilation. Venetian or other blinds can be used at these windows without obstruction. Screens are available. For maximum value, insist on Bayley Aluminum Projected Windows.

#### BACKED BY 70 YEARS OF SPECIALIZED EXPERIENCE

Drawing below shows depth and thickness of rail and ventilator sections.



BAYLEY Projected  
Windows are also  
available of steel  
construction

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## A few typical **BAYLEY** School Installations

Below: exterior and interior of Textile Laboratory,  
Georgia Institute of Technology, Atlanta,  
Bush, Brown, Gailey, Heffernan, Architects; Ray M. Lee Co., Builder.



Left: Science Bldg.,  
Wayne University, Detroit.  
Ralph R. Calder, Architect;  
W. E. Wood Co., Builders.



**SYMBOLS  
OF  
RELIABILITY**



For detailed information, con-  
tact any BAYLEY office listed  
on preceding page.



## Major advantages of **BAYLEY** ALUMINUM PROJECTED WINDOWS

- **ATTRACTIVE** — styling is modern and streamlined in every way
- **ECONOMICAL** — require no painting or expensive maintenance
- **PERMANENT** — materials conform to rigid specifications
- **SIMPLICITY** — no gears, cranks, or other complex mechanism
- **UNIVERSAL** — readily adapted to any structural treatment
- **COMPLETE** — all set for installation and outside glazing
- **ACCESSIBLE** — smooth surfaces easy to wash from inside
- **VENTILATING** — provide awning protection and "no-draft" air flow



Above: Birch Hall, Antioch College, Yellow Springs, Ohio.  
Saarinen and Swanson, Architects; Wermuth, Inc., Builder.

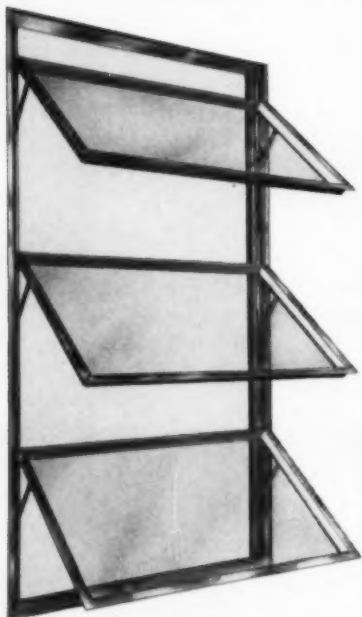
Below: Wm. Penn School, Pittsburgh, Pa. Joseph Hoover, Architect;  
Helvenston Construction Co., Builders.



# UNIVERSAL WINDOW COMPANY

950 Parker Street • Berkeley 10, California

## DONOVAN-UNIVERSAL ALUMINUM WINDOWS



### FEATURES . . .

#### Donovan - Universal Operating Hardware

Opening the lower vent automatically opens the vents above, moving them in unison.

The automatic concealed release allows the lower vent to be closed independently of the upper vents.

Returning the lower vent to the position of the open upper vents permits readjustment or closing.

Locking the lower vent, when the upper vents are closed, automatically locks the entire window.



### AWNING TYPE

### PROJECTED TYPE

### CASEMENT TYPE

offer you these advantages:

**MAXIMUM LIGHT** Narrow sections permit increased glass area for ideal natural lighting.

**ALWAYS ATTRACTIVE** Trim and modern in appearance. Natural finish harmonizes with any architectural style and color scheme.

**EASY TO INSTALL** Delivered completely assembled, ready for glazing. No finishing to apply. Sturdily built yet light in weight for easy handling and rapid installation.

**FOR ALL TYPES OF CONSTRUCTION** Ideal for frame, concrete, brick, stucco, block or veneer construction with or without screens.

**EASY, TROUBLE-FREE OPERATION** Windows always open easily, close tightly. Cannot swell, warp or stick.

**NO PAINTING REQUIRED** Cuts original installation costs. Eliminates year-to-year painting expense.

**NO MAINTENANCE PROBLEMS** Precision-built. Rigid Alcoa aluminum sections cannot rust or rot. Easily cleaned with a damp cloth.

## FEATURES OF DONOVAN - UNIVERSAL AWNING TYPE WINDOWS

### 1. FULL FRAME VENTILATION

The entire window area can be opened for ventilation. Maximum ventilation with double hung windows is 50%.

### 2. CONTROLLED VENTILATION

With the lower vent closed and the upper vents opened any desired amount, air currents are directed upward, eliminating direct drafts.

### 3. CONTROLLED DAYLIGHTING

The angle of the open sash, with shades attached, deflects the light upward, eliminating the glare of direct sunlight.

### 4. WINDOW POLES ELIMINATED

The Automatic Control feature eliminates opening, closing and locking individual vents by means of a pole.

**DONOVAN-UNIVERSAL** manufactures a complete line of **AWNING TYPE, PROJECTED and CASEMENT ALUMINUM WINDOWS**. Awning Type and Projected windows feature our patented Multiple Operating Hardware, specified by leading architects for more than 15,000 schools and other buildings. Backed by 30 years of experience in the window business, our engineers are always at your service to help you with your window problems. Sales Representatives are located in principal cities. Write today for full details and the name of your nearest representative.

**5. WINDOWS WASHED FROM THE INSIDE** Both sides of all windows are easily washed from inside the building.

### 6. YEAR-ROUND VENTILATION

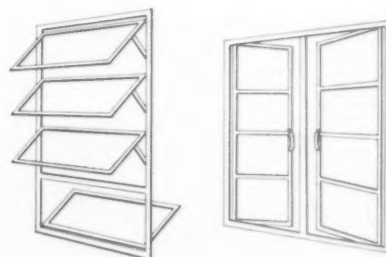
The protective angle of the open vents keeps out the rain and snow while allowing natural ventilation. Window shades and screens are also protected.

### 7. NO PROBLEMS WITH VENETIAN BLINDS

The lower vent control feature makes it unnecessary to raise Venetian blinds more than a few inches to adjust the upper vents.

### 8. CONCEALED OPERATING HARDWARE

Smooth - working, trouble-free operating hardware is concealed within the frame for protection from weather.

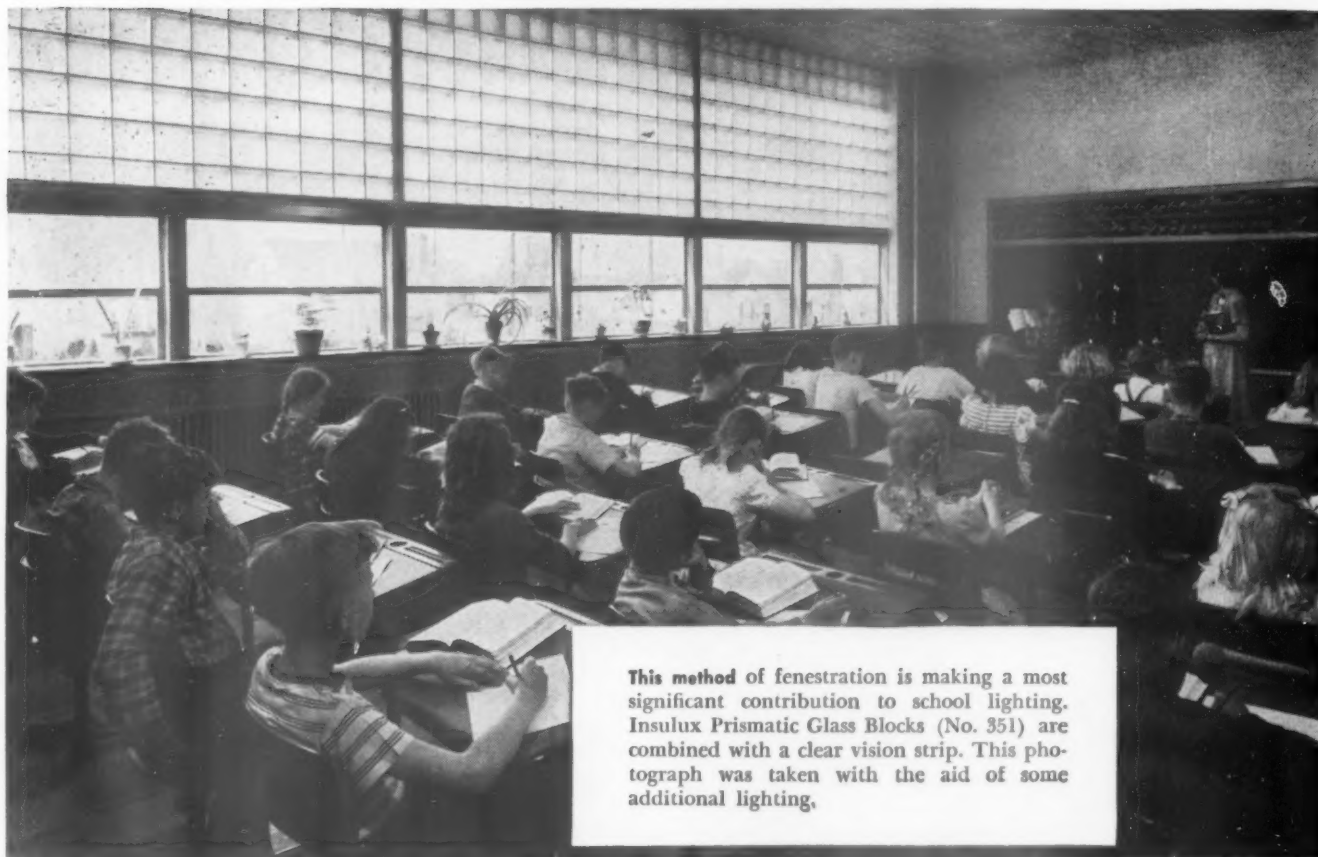


THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

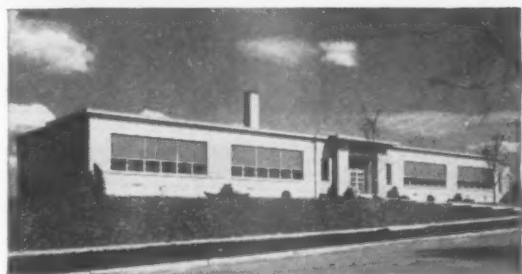
# AMERICAN STRUCTURAL PRODUCTS CO.

Subsidiary of Owens-Illinois Glass Company, Dept. F-13

TOLEDO 1, OHIO



This method of fenestration is making a most significant contribution to school lighting. Insulux Prismatic Glass Blocks (No. 351) are combined with a clear vision strip. This photograph was taken with the aid of some additional lighting.



In the Oakdale Christian School, Architect James K. Haveman, Grand Rapids, Michigan, has created a pleasing, unadorned exterior. See how well Insulux complements his design.

## This kind of school daylighting doesn't "just happen"

**L**OWER brightness ratios, better daylight distribution, designed into new Oakdale Christian School, Grand Rapids, Michigan, by architect James K. Haveman.

This daylighting is the result of long research and careful planning. *It didn't just happen!*

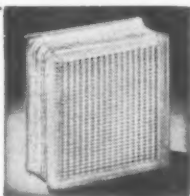
**The first factor** in achieving these lighting benefits was the development and light-performance measurement of a light-directional glass block fenestration system which could meet the exacting requirements of the school classroom.

**Next step** was proper interior room design, including reflectivities to make the system work to best advantage.

As a result of studied planning, most brightness ratios are kept within 10 to 1, within a 60-degree cone of vision. Diversity in task brightness from first desk to last desk across the room is kept within a ratio of 5 to 1 under illumination of sky only, and about 3 to 1 under direct sun.

**Write** for free manual, "Daylight in School Classrooms," which contains complete technical information useful in planning better school lighting. Write Dept. G-217, American Structural Products Company, P.O. 1035, Toledo 1, Ohio. (American Structural Products Company is a wholly owned subsidiary of the Owens-Illinois Glass Company. It has taken over the manufacture and sale of Insulux Glass Block and other Owens-Illinois structural products.)

Insulux Prismatic Block No. 351 has been developed for accurate daylight control. The pattern, utilizing the four faces of the block, turns light upward. The ceiling acts as a huge reflector to redirect light downward.



## INSULUX GLASS BLOCK®

AMERICAN STRUCTURAL PRODUCTS COMPANY

Subsidiary of

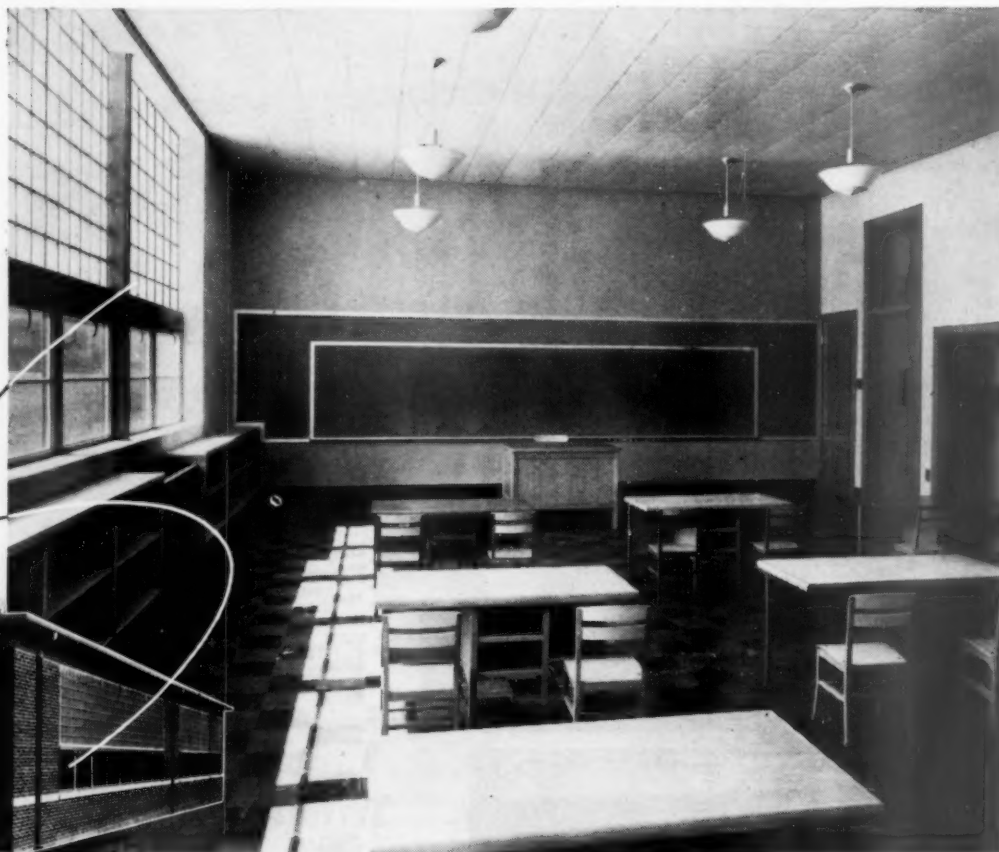
OWENS-ILLINOIS GLASS COMPANY

## PITTSBURGH CORNING CORPORATION

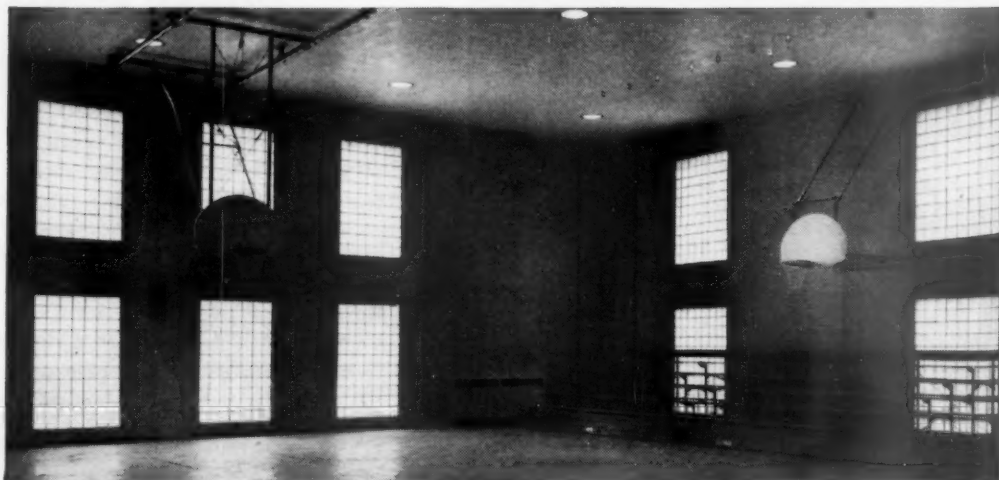
Dept. C-01, 307 Fourth Avenue, Pittsburgh 22, Pa.

# Students do better work . . . when

THESE INTERIOR AND EXTERIOR views of the Wilson Elementary School, Wilson, Arkansas, are a splendid example of the functional advantages of PC Soft-Lite \* Prism B Glass Blocks for sun exposures. The directed light from these glass block panels reaches even to the far wall. And all over the room, daylight is adequate, soft and evenly diffused. From the outside, too, PC Glass Blocks add a highlight of beauty to the school's architecture. Architects: Trapp & Clipard, Little Rock, Ark.



A WALL OF GLASS is what a "gym" needs. But make sure that it is the right kind of glass — PC Glass Blocks. Because, while providing ample daylight, they offer you actual money-saving advantages — in minimized danger from breakage, in reduced heating and maintenance costs; and they afford privacy. Takoma Park School, Montgomery County, Md.



# GLASS BLOCKS

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



# you give them the benefits of **PC FUNCTIONAL GLASS BLOCKS**

That has been proved in school after school all over the country. For PC Functional Glass Blocks provide *directed light for better sight*. That means less tension and eye fatigue among pupils; happier, more alert children. And its benefits are felt by teachers as well.

The reason for this is easy to explain: PC Functional Glass Blocks, while admitting an abundance of daylight, filter its "rawness," so to speak . . . control the light by bending or directing it upward to the reflecting ceiling, and by diffusing it to all parts of the room. The Soft-Lite \* edge patterns—exclusive with PC Glass Blocks—are especially effective for the extreme brightness conditions found on sunny exposures.

Moreover, PC Glass Blocks are attractive to school governing bodies because they possess actual money-saving advantages. Here are a few of them: They eliminate sash replacements and repairs; require no painting; are more easily cleaned than small, individual panes.

Also, PC Glass Blocks substantially reduce heating and air-conditioning costs. Being hollow, with a partially-evacuated dead-air space inside, they give more than twice the insulating value of ordinary windows. And they provide privacy, shut out unsightly or distracting views, stop infiltration of dust and grit, deaden noises.

Why not write for our free booklet on the use of PC Glass Blocks in Schools and other Public Buildings? It includes detailed information and illustrations of the complete PC Glass Block line, as well as a list of available sizes, shapes, and installation data and specifications.

\*T.M. Reg. applied for.

FOR ADDITIONAL INFORMATION, SEE OUR INSERTS IN SWEET'S CATALOGS



LET THE "exuberance of youth" have full sway. But make it safe, especially at stairwells. It is easily done with PC Glass Blocks to admit floods of daylight to these areas. Edward Everett Elementary School, Detroit, Mich. Architects: Giffels & Vallet, Inc., Detroit, Mich.



THERE IS PLENTY OF DIFFUSED LIGHT for all seeing tasks, when PC Functional Glass Blocks are installed in school machine shops. Besides, PC Glass Blocks deaden noises, are easy to clean, seldom if ever need replacements. Stemmers Run Junior High School, Stemmers Run, Md. Architects: Palmer, Fisher, Williams & Nes, Baltimore, Md.

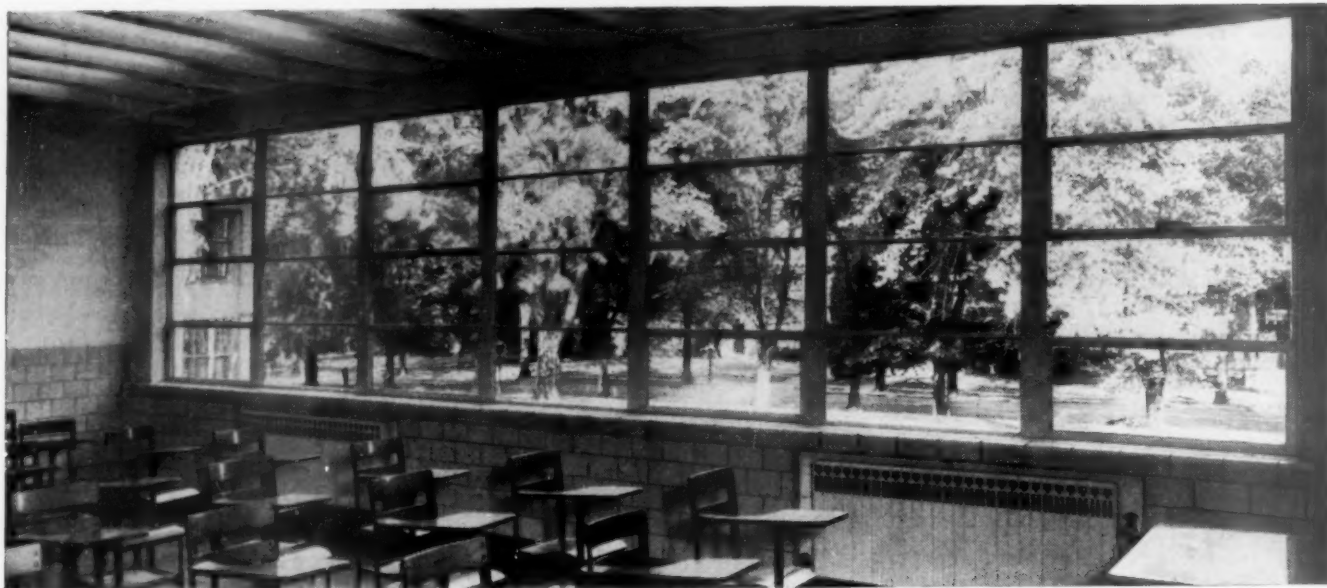
*The mark of a modern building*

Distributed by  
PITTSBURGH PLATE GLASS COMPANY  
by W. P. Fuller & Co. on the Pacific Coast and  
by Hobbs Glass Ltd. in Canada

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# LIBBEY-OWENS-FORD GLASS COMPANY

5465 Nicholas Building  
Toledo 3, Ohio



Architect: Albert A. Rumschik, Buffalo, N. Y.

## New Research shows how to get *Better Vision...* **ECONOMICALLY**

Research recently completed at Southern Methodist University by Prof. R. L. Biese, Jr., shows that you can fully, and *economically*, meet the recommendations of the 1948 American Standard Practice for School Lighting by the intelligent use of flat glass.

It establishes techniques which enable you to take advantage of the high light transmission of flat glass in achieving desired levels of illumination and proper brightness patterns for good seeing.

These techniques include the use of shielded unilateral fenestration, interior decoration with non-glossy surfaces of high reflectance, and proper seating arrangement to give each pupil enough light on his visual task and desired brightness ratios

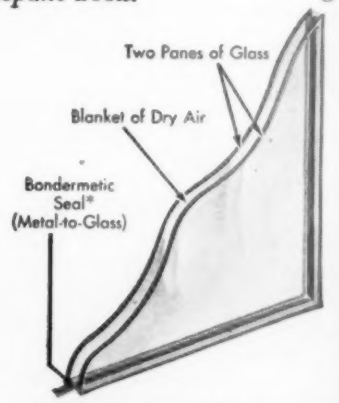
within his visual field.

Thus, with economical flat glass, you can provide the quality of daylighting which means less eye fatigue ... keener interest in school work ... improved posture habits ... better physical and mental development.

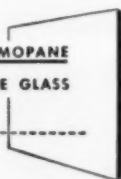
L·O·F *Thermopane*<sup>®</sup> insulating glass is an ideal means of obtaining these conditions when insulation of window walls is desired. A double-glazed window of clear, flat glass transmits more daylight than an equal area of any other form of double glass insulating unit. *Thermopane* composed of two panes of clear glass transmits approximately 81% of daylight. To meet special requirements, *Thermopane* may be fabricated with varied types of flat

glasses, including Polished Plate, Sheet, Heat Absorbing, Tuf-flex<sup>®</sup> and Patterned Glass.

Write us for further information on the Biese research and for our *Thermopane* book.



FOR BETTER VISION SPECIFY **THERMOPANE**  
MADE WITH POLISHED PLATE GLASS



# Thermopane

MADE ONLY BY LIBBEY-OWENS-FORD GLASS COMPANY  
5465 Nicholas Building, Toledo 3, Ohio

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



Your School Benefits in 4 Important Ways  
When You Order Venetian Blinds with New

*Flexalum*®

SPRING-TEMPERED SLATS AND VINYL PLASTIC TAPES

- Maximum control of light-glare
- Maximum control of ventilation
- Hours saved in cleaning time, dollars saved on maintenance costs
- Repair and replacement costs cut to minimum



# For slats that serve you and your students most efficiently, because they

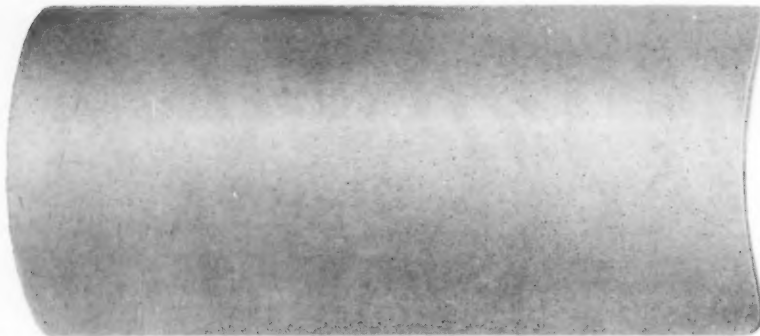
- ... permit maximum light and air control
- ... reduce maintenance and replacement costs to a minimum
- ... keep their shape and finish through years of use

## SPECIFY

*Flexalum* spring-tempered aluminum slats

slats

## NEW FLEXALUM SLAT SPECIFICATIONS



Top View



Side View

- 1. Type of Material:**  
Aluminum alloy.
- 2. Processing of the Material:**  
Heat treated (spring tempered) and cold worked to obtain maximum strength and hardness.
- 3. Width and Thickness:**  
Width 2" to .020 under 2".  
Thickness .010 plus 0 minus .001.
- 4. Treatment Prior to Application of Finish:**  
Duratized to obtain maximum bond between the paint and aluminum.
- 5. Type of Finish:**  
Highest quality alkyd base baking enamel.
- 6. Performing Data:**  
Route bend . . . bend up to 90° without deformation.

Traverse bend . . . will bend round  $\frac{3}{4}$ " radius without deformation.

Weight . . . 40 lineal feet per pound.

Resistance to chemicals, heat and moisture:  
Salt spray—500 hours, no effect. Water immersion—250 hours, no effect (according to independent laboratory tests).

- 7. Available Colors:**  
Eggshell — Ivory — White — Oyster White — Yellow — Blue — Peach — Light Green — Beige — Dark Green — Terra Cotta — Natural — Pastel Blue — Pastel Green — Gray.
- 8. Product Identification:**  
The name FLEXALUM embossed in material as rolled. Name appears on the concave side of strip, approximately every 18" and is visible only on close examination.



UNITED STATES TESTING COMPANY  
GENERAL OFFICE 100 PARK AVENUE  
ROCKEFELLER PLAZA  
NEW YORK 17, N.Y.

April 7th 1964.

Hunter Douglas Corporation  
130 Broadway  
New York 7, New York

Gentlemen:

We have tested your "FLEXALUM" material and other widely distributed competitive brands. These blinds were of basic steel construction.

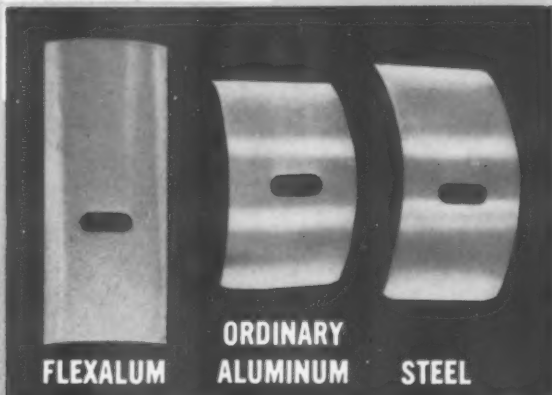
All five of these samples including your

1. **Water Immersion** - This test was made to determine the effect of water immersion on the material. The material was stand up in damp air for 250 hours in order to determine the effect of salt air, salt spray or similar atmospheric conditions.
2. **Resistance to Salt Spray** - This test was made to determine the effect of salt spray on the material. The material was stand up in salt spray for 500 hours in order to determine the effect of salt spray on the material.
3. **Resistance to Detergents** - This test was made to determine the effect of washing with materials commonly used in the household. Three tests were made:
  - A - Using a mild soap containing no fillers.
  - B - Using a laundry powdered soap containing alkaline builders.
  - C - Using a synthetic detergent.

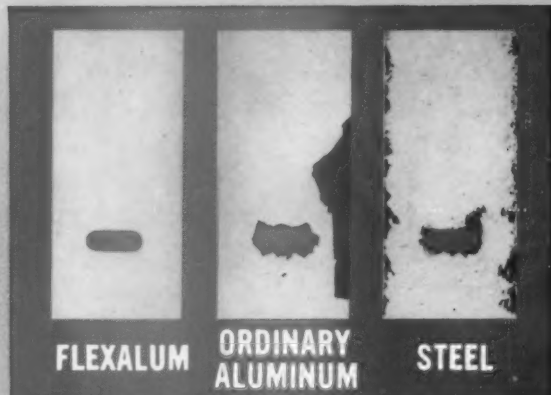
We are one of the most prominent of these



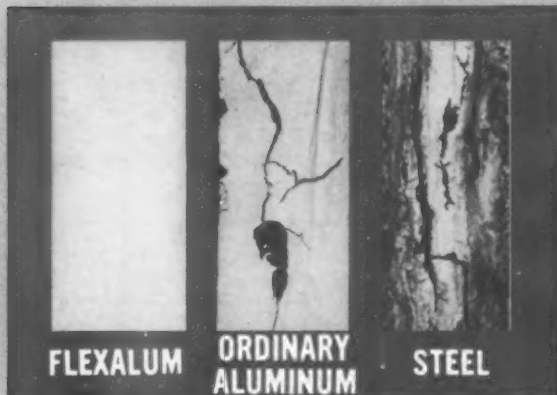
## TESTS PROVE THE SUPERIORITY OF FLEXALUM SLATS



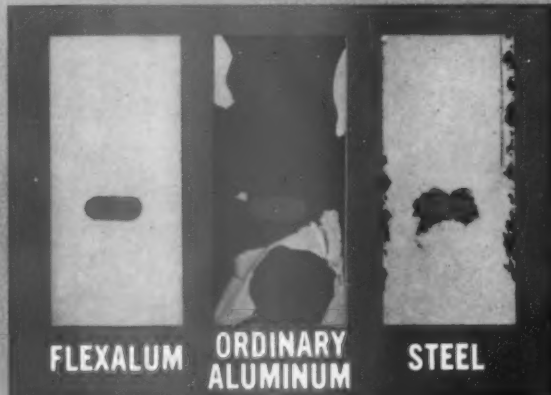
**GREATER BEND STRENGTH.** Flexalum specimens bent around a mandrel with a  $\frac{3}{4}$ " radius snap right back into shape. Flexalum slats will bend to a 90-degree angle at the route hole. Note comparative tests.



**UNAFFECTED BY WATER IMMERSION.** Flexalum is unaffected after 250-hour water immersion test. Note comparative tests.



**NON-CORROSIVE.** After 500 hours under a shower of salt spray. Flexalum slats show no change. Note comparative tests.



**COMPLETELY WASHABLE.** 375 hours in a laundry soap solution fail to affect Flexalum slats. Note comparative tests.

## Specify *Flexalum* Spring-Tempered Slats Because:

**Easy To Clean.** Flexalum slats are completely washable, and because of their greater resiliency can be quickly cleaned without damage.

**Minimum Maintenance Cost.** Due to the lasting beauty and durability of Flexalum.

**Keep Their Shape.** Flexalum spring-tempered slats when bent at 90° angle snap back to perfect shape—will not sag.

**Will Not Rust.** Flexalum slats are non-corrosive, withstand salt air, extremes of climate and chemicals in the atmosphere.

**Lasting Beauty.** The special plastic finish prevents

fading, chipping, peeling or cracking—eliminates refinishing costs.

**Cover Larger Areas.** Flexalum spring-tempered slats are only  $\frac{1}{3}$  the weight of ordinary slats, are easily handled in large sizes for professional buildings.

**Maximum Light Control.** Thin Flexalum slats nest closely, permit finer control of light.

**Extra Insulation.** Flexalum slats have the smoothest of plastic finishes which, together with the curvature, insures maximum deflection of sunlight and perfect closure.

See next page for Flexalum Vinyl Plastic Tape

# For tapes that protect you and your students because they

... resist heavy wear and tear, reduce replacement costs to a minimum

... can be wiped clean quickly and easily, cut maintenance costs drastically

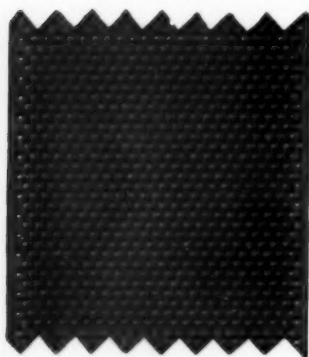
... are non-porous, will not absorb dirt

SPECIFY

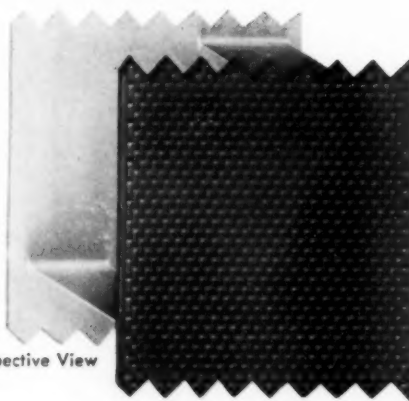
new *Flexalum* vinyl plastic tape

tape

## VINYL PLASTIC TAPE SPECIFICATIONS



Top View



Perspective View

### 1. Description:

Flexalum Vinyl Plastic Tape is a cast vinyl plastic reinforced with 140 individual pre-shrunk fortisan threads to insure dimensional stability. Cross ladders are plastic permanently welded to the side tapes with a flexible hinge.

### 2. Dimensions:

Ladder spacing—Type "A"—7 slats/foot  
Width of face of tape—1½"  
Cross ladder length for 2" slat width  
Weight of tape—27 ft./lb.

### 3. Performance Data:

By independent laboratory tests.

a. **Stretch**—less than ½% stretch with 10 lb. load on dry sample.

b. **Shrinkage**—no shrinkage when soaked 48 hrs. in water and then air dried.

c. **Accelerated Aging Tests**—Fade - ometer, Weather - ometer, Salt Spray.

**Fade-ometer**—after 100 hrs. exposure in Fade-ometer and 20 hr. intervals of examination, there was good fastness, viz., no fading.

**Weather-ometer**—after 300 hrs. of exposure to Atlas Twin Arc Weather-ometer, there was no apparent degree of degradation.

**Salt Spray**—after 500 hrs., there was no effect, either from point of view of function or appearance.

d. **Cleanability**—common household items such as fruit juices, lactates, oils or greases could all be removed easily with a damp cloth. The tape was unaffected by Ammonium Hydroxide 5%, Hydrochloric Acid 5%, Alcohol and Carbon Tetrachloride.

After a 2 hour boiling in water, the tape showed no change.

### e. Tensile Strength—one side tape only.

As received—70 lbs. average.

After 100 hrs. Weather-ometer—69½ lbs. average.

After 200 hrs. Weather-ometer—68½ lbs. average.

### Tensile Strength of Cross Ladder

As received—25 lbs.

After 100 hrs. Weather-ometer—25 lbs.

### f. High and Low Temperature Tests—specimens, when exposed in an air-oven to a temperature of 212°F. for a period of 24 hrs., showed no change in appearance or function.

Effect of cold temperature—specimens, when exposed in a conditioning chamber to a temperature of -40°F for a period of 24 hrs., showed no change in appearance or function. The sides and ladders of all plastic tapes were still very pliable.

Effect of heat and humidity—specimens of each sample were exposed in a conditioning chamber to an atmosphere of 120°F. and 95% relative humidity for 24 hrs. At the end of this period, there was no change in the appearance or function of any of the plastic tape.

### g. Fire Resistance—on tests according to ASTM—D-626-41T—Flexalum Vinyl Plastic Tape showed NO afterglow and 1" average char. Would not support combustion.

### 4. Available Colors:

**Duplex Tape (outside Duck)**—Mulberry, Chocolate, Blue, Pastel Blue, Red, Dark Green, Pastel Green, Yellow, Gray.

**Solid Color Tape (same color inside and outside)**—White, Duck.

**Color-Matching** Tapes in White, Gray, Yellow, Pastel Blue, Pastel Green match corresponding slat colors exactly.





UNITED STATES TESTING COMPANY  
GENERAL OFFICE: 100 PARK AVENUE  
HOBOKEN, N. J.

July 18, 1949

Hunter Douglas Corp.  
170 Broadway  
New York 7, N. Y.

Attention: Mr. S. R.

Re: Flexal

To: Mr. S. R. Hunter Douglas Corp.  
Flexal tape tested under our Test No. 10-10-2000  
subjected to the following tests:

1. Support of Construction
2. Effects of Acid and Alkali
3. Salt Test (Basis of Cleaning)
4. Effect of Dry Heat (212°F. - 24 hours)
5. Effect of Cold Temperature (-80°F. - 24 hours)
6. Effect of Heat and Humidity
7. Effect of Boiling Water
8. Shrinkage in washing
9. Salt Spray Test
10. Weatherometer Test
11. Pendulum Test

The results of these tests indicate that the Flexalum Vinyl Plastic Tape on an overall basis is superior to the Cotton tape in:



SMITH-ENERY COMPANY

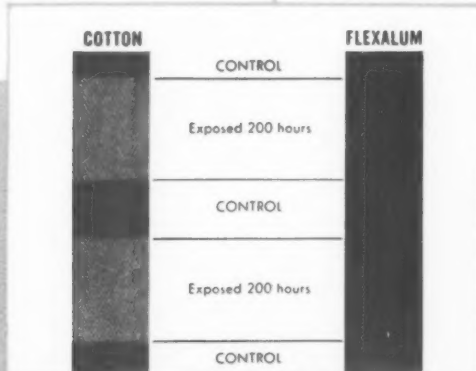
CHESTER-ENGLAND  
300 BATTERY STREET  
LOS ANGELES 12, CALIF.

June 17, 1949

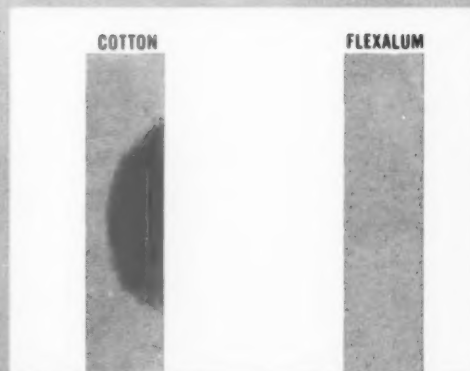
Mr. Hunter Douglas,



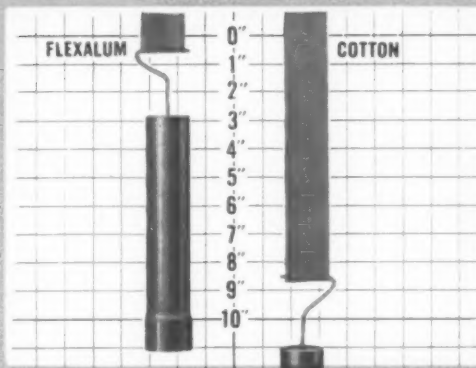
## TESTS PROVE THE ADVANTAGES OF FLEXALUM TAPE



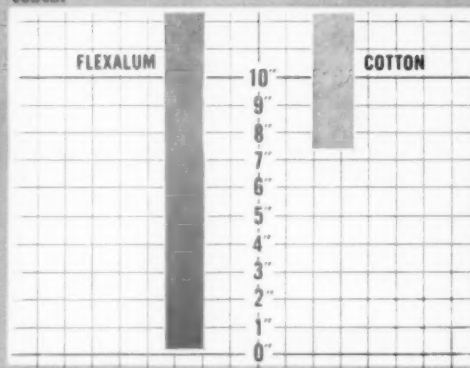
**WON'T FADE.** After 200 hours exposure to ultra violet light Flexalum tape showed no apparent change. Note comparison.



**SOIL PROOF.** Note comparison between Flexalum and cotton tape after soiling and washing tests.



**STRETCH PROOF.** Flexalum vinyl plastic tape shows less than 1/2 of 1% stretch after hanging for 24 hours with a 10-pound weight attached. Cotton tape shows over 10% stretch under the same conditions.



**SHRINK PROOF.** Flexalum tape does not shrink after 24 hours of soaking and air drying. Cotton tape shrunk over 7%.

### When You Specify *Flexalum*® Vinyl Plastic Tape:

**Stays sanitary.** Flexalum tape stays cleaner because its surface is smooth and non-absorbent. It is completely washable . . . almost all soil marks can be removed with a damp cloth.

**Minimum maintenance.** Flexalum tape reduces cleaning time from hours to minutes, releases time and personnel needed elsewhere.

**Replacement costs minimized.** Because Flexalum vinyl plastic tape does not deteriorate. It is weather-proof, is unaffected by any climatic conditions, will not support mildew.

**Will not fade.** Flexalum colors are achieved with sealed-in pigments, not dyes.

**Larger blinds possible.** Flexalum tape re-inforced with Fortisan does not stretch, even under prolonged tension.

**Permanent precision fit.** Because Flexalum tape has dimensional stability.

**Lasting beauty.** Flexalum tape harmonizes perfectly with beautiful Flexalum slats. Its good looks will last as long as the slats themselves.



*Birdwell Elementary School, Tyler, Texas, installs Flexalum venetian blinds for maximum classroom efficiency*

## **NO OTHER WINDOW COVERING CAN GIVE YOUR SCHOOL THE ADVANTAGES OF FLEXALUM VENETIAN BLINDS:**

**FLEXIBLE LIGHT CONTROL.** Complete control of the amount of light entering the classroom. Slats can be tilted up for subdued illumination, down for direct-to-desk illumination, straight for full, broad diffusion of light. No other window covering allows you to make such varied and specific adjustments to classroom needs and time of day.

**ELIMINATION OF GLARE.** Simple adjustment of the position of the slats gives students the light they need with none of the glare that causes eyestrain. Only venetian blinds can deflect glare so efficiently.

**MAXIMUM CONTROL OF VENTILATION.** Slats nest closely, shut out drafts effectively. Maximum opening gives the classroom as much air as if window were wide open and uncovered — yet light glare is controlled perfectly.

**...ONLY FLEXALUM SLATS WITH FLEXALUM PLASTIC TAPES CAN  
CUT MAINTENANCE AND REPLACEMENT COSTS TO A MINIMUM**

Sample venetian blind slat and tape specifications to use when you order

## *Flexalum*

**Slats:** All slats to be preformed spring tempered Flexalum aluminum alloy 2" wide. End of slats and cord punches shall be smooth and free from burrs, with rounded corners not less than  $\frac{1}{4}$ " radius and not more than  $\frac{9}{32}$ ". Suspension of slats between tapes not to exceed 30".

**Slat Finish:** Slats are to be Duratized or equivalent treatment to provide maximum bond between aluminum and paint finish. Baked enamel finish to be Alkyd resinous base or

equivalent to provide maximum resistance against chalking or deterioration under exposure to strong sunlight. Finish is to be capable of withstanding 250 hours of standard salt spray test with no appreciable deterioration of paint or metal. Color to be selected from fifteen FLEXALUM standard colors.

**Tape:** Shall be Flexalum vinyl plastic tape. Color as selected from Flexalum standard colors.

*We will gladly send you specifications on all other component parts if you will advise us of the applications and sizes of the venetian blinds you are planning.*

### **WRITE FOR FREE COPY OF FLEXALUM VENETIAN BLIND ARCHITECTURAL PORTFOLIO**

... containing detailed drawings to scale and specifications of a new window head pocket for recessing venetian blinds for all types of windows and various types of constructions. This new window plan eliminates all obstructions in window openings when the blinds are not in use. Included are samples of Flexalum products and other architectural information.

**BE SURE YOU SPECIFY VENETIAN BLINDS WITH**

## *Flexalum.*

### **SPRING-TEMPERED SLATS AND VINYL PLASTIC TAPE**

They are made by quality manufacturers and sold through leading dealers in every locality from coast to coast. Contact your local custom manufacturer or dealer or write to

### **HUNTER DOUGLAS CORPORATION**

RIVERSIDE, CALIFORNIA and 150 BROADWAY, NEW YORK 7, N. Y.

Sales Offices: Atlanta • Chicago • Dallas • Los Angeles

Canada: Hunter Douglas Ltd., Montreal, Quebec • Mexico: Hunter Douglas, S.A., Mexico City, D.F.



**Venetian Blinds**

**with**

*Flexalum®*

**Spring Tempered Slats and Vinyl Plastic Tape**

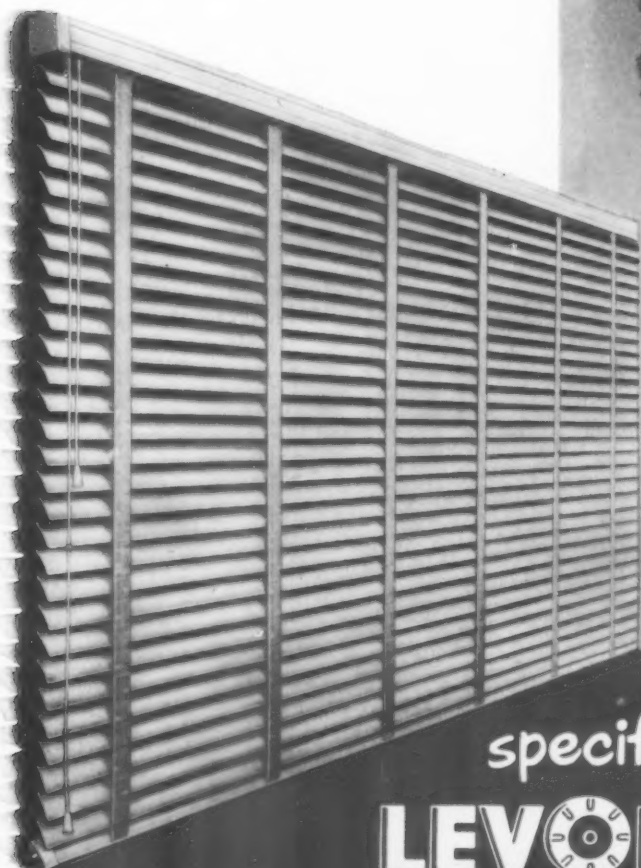


**BE SURE YOU SEE THIS MARK!**

The Flexalum visible-invisible trademark is your guarantee of venetian blinds with all Flexalum's exclusive features.

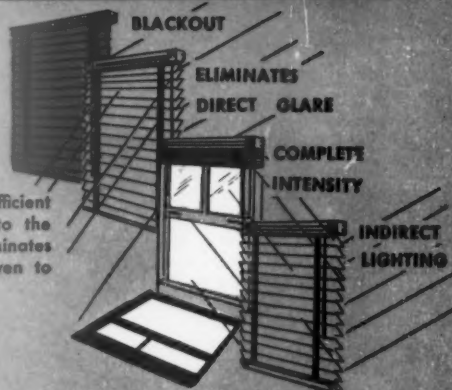


# Get ALL the Advantages a GOOD Venetian Blind Offers



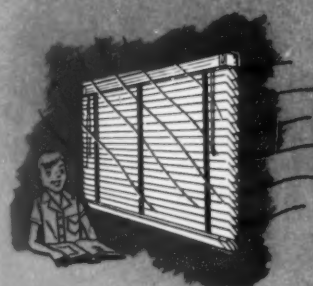
## CONTROLLED LIGHTING

No other window covering offers such efficient light control. Intensity can be varied to the finest adjustment by tilting slats—eliminates glare and affords optimum diffusion, even to the "inside" portions of the room.



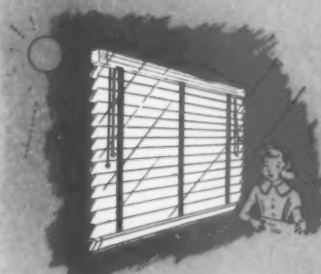
## CHEERFULNESS

Venetians take away the harshness of drab covering—cheers up the room and the morale. The psychological effect when used in color is a factor worth considering.



## CONTROLLED VENTILATION

Wide open windows—without DRAFT. Tilted slats deflect the intruding air upward or downward as desired, putting a full-length ventilator at every window.



## CONTROLLED TEMPERATURE

Venetian Blinds will DEFLECT the heat of the sun—by actual proof, lower the temperature and completely eliminate DIRECT sunlight in near-window areas of a room—reduces inside heat escapement in winter.



## SAFETY

LEVOLOR adds a new safety feature,—the enclosed metal head—one unit with no loose parts, tamper proof and solidly anchored on a sheer pull. Cannot be pulled down by a vandal.

## ECONOMY

Not only do Venetians stand up under hard use year after year, but they offer a minimum in cleaning costs plus the advantage of replacement parts.



## SANITATION

LEVOLOR, all metal Venetians eliminate moulding problems. The entire surface is exposed to clean sunlight. Dust and dirt wipes off with the swish of a cloth to keep them always bright and sparkling.

specify  
**LEVOLOR**

time-proven products for Venetians

FOR QUALITY VENETIANS

SPECIFY THESE

3

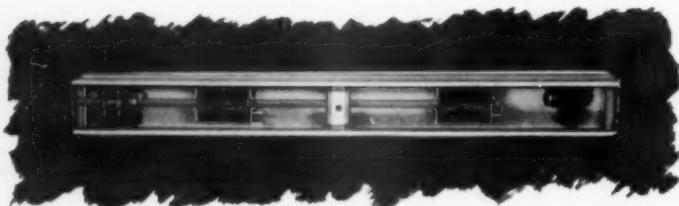
LEVOLOR

FEATURES

LEVOLOR heads, slots,  
chrome-finished inside  
(sliding 5mm) that  
smooth finish with  
cleans by a simple  
color for a perfect

system bars are zinc coated  
with a hard plastic finish  
resisting its surface  
dust and grime which  
available in nineteen  
from top to bottom.

## A NEW METHOD OF TILTING



Replacing wood tilt bars and tacked or stapled tapes, the LEVOLOR system tilts from INSIDE the head. The tilt rod passes through the machine-clinched hardware, giving accurate alignment, finer operating features and longer life to the entire mechanism. Notice how the entire structure becomes one working part. Tape and cord replacements are simple when necessary.

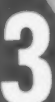
## LEVOLOR, SELF-ADJUSTING TILTERS



One of the largest sources of maintenance cost used to be the tilting device. Tilt cords would creep out of reach and the blinds become useless. This condition is impossible on venetians equipped with LEVOLOR tilters. LEVOLOR tilters work on a gear and worm escapement principle. Limit beads stop the cord from getting out of reach. By pulling the short cord, both tassels become even. However, as a rule, constant use keeps them in an even position automatically — without conscious adjustment. Venetians have been operating in large installations up to 15 months without a single call for janitor service. Genuine LEVOLOR tilters are identified by "Patent 2174994" and the Lorentzen "Iron Man."

ALL ARE MATCHED IN COLOR, QUALITY AND FINISH



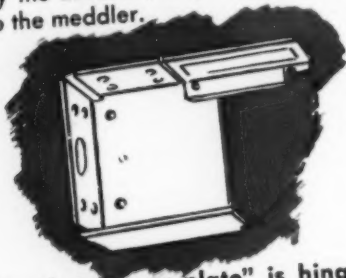


**LARGE  
OPENING**

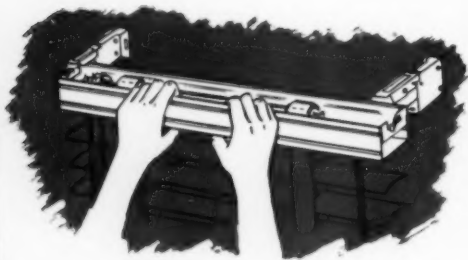
LEVOLOR LORENTZEN, INC., 391 WEST BROADWAY, NEW YORK 12, N. Y.

# STRONG ECONOMICAL INSTALLATIONS

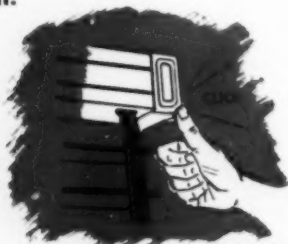
...LEVOLOR Metal Set installations offer a decided advantage. A minimum of parts are involved—two brackets and the blind which slides in as a complete unit. Not only does it cut down costs but it offers the strongest installation method possible. Brackets are screwed into the side of the jamb and all strain is a sheer pull. Although easily removed by the initiated, they are uninviting to the meddler.



Bracket "cover plate" is hinged and swings up to receive the head.



Head slides smoothly into position.



And is held in position by a snap lock. To open, insert a screw driver and twist, lift hinge and slide out entire unit.

## LEVOLOR

Time Proven Products  
for Venetians

## SPECIFICATIONS FOR VENETIAN BLINDS

### HEADS AND BOTTOM BARS

The blinds shall be equipped with Lorentzen LEVOLOR Metal Set heads and bottom bars formed of bonderized steel not less than .025" thickness.

They shall have a baked plastic coating in the color selected by the owner, architect or contractor.

### HARDWARE

The hardware shall be of the De Luxe type which includes the E-11-D-1 LEVOLOR self-adjusting tilter with properly installed limit beads.

Installation brackets shall provide three-way installation.

Hold down brackets shall be provided for door installations.

### SLATS

The slats shall be LEVOLOR 88 aluminum slats not less than .0095" nor more than .011" in thickness and 2" in width, or steel galvanized bonderized .008" in thickness and 2" in width.

The color shall be as selected by the owner, architect or contractor.

The slats shall have a crown of about  $\frac{1}{8}$ ". The crown shall form a true, even line and must not consist of a series of longitudinal streaks or sections. The slats must also be free from visual longitudinal bow.

### TAPES

Tape shall be made of a non-stretchy fabric consisting of two facings  $1\frac{1}{2}$ " wide with uniformly spaced solid woven cross ladders at least  $\frac{1}{8}$ " wide with ends interwoven into the back of the facings.

It shall be equal to that manufactured by.....

Tape size shall be "A".

### CORDS

Cords shall have an outer "tube" of uniformly braided cotton with a core of one or more strands of firmly twisted cotton or rayon yarn.

It shall be #4½ size and be equal to that manufactured by.....

### WORKMANSHIP

The size and arrangement of related parts shall insure proper operation and a neat balanced appearance of the blind.

There shall be no defects which affect the operation or appearance of the blind.

### INSTALLATION

Wherever practical the blind shall be installed so that it will hang between the window jambs. The clearance between the end of the slats and the window jamb shall never be greater than  $\frac{1}{4}$ " on either side.

## LEVOLOR LORENTZEN, INC.

391 West Broadway, New York 12, N. Y.

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PRINTED IN U. S. A.

ESTABLISHED

Since 1828

Members of the One  
Hundred Year Association,  
Inc., of New York

# CORNELL IRON WORKS, INC.

36th Avenue at 12th Street, Long Island City 6, N. Y.

102 REPRESENTATIVES IN PRINCIPAL CITIES

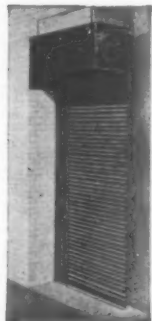
Telephone

Stillwell 4-3880-1-2-3

## PRODUCTS

ROLLING GRILLES AND GATES in steel and other metals; SLIDING GRILLES in steel or aluminum; ROLLING DOORS and SHUTTERS in steel, other metals and wood; Underwriters labeled rolling STEEL FIRE DOORS; complete line of UPWARD ACTING DOORS in wood or metal; MOTOR OPERATORS. Makers of fine doors for over one hundred years. CORNELL IRON WORKS, INC., owes its origin to George Cornell, who purchased his employer's metal business July 29th, 1828, in New York City.

SEND FOR CATALOG W



(Above) LABELED ROLLING STEEL (Lienroc) FIRE DOOR, coiling under lintel in the opening between the jambs. Shown in section. Note the overhead counterbalancing hoist, used both in rolling doors and rolling grilles; and the enclosing hood. Side guides may be concealed in the wall and the overhead coil hidden in the ceiling



Pair of fully concealed CORNELL ROLLING STEEL AUTOMATIC FIRE DOORS coiling under lintel. (Photos show open and partially closed positions)

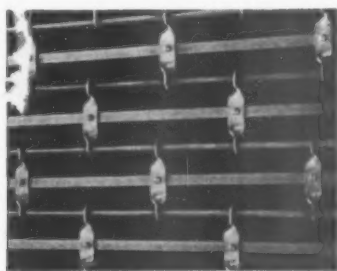
## CORNELL ROLLING DOORS AND ROLLING GRILLES

The Rolling Doors are made up of interlocking metal slats running in vertical metal side guides, flexible to coil. Steel curtains are hot galvanized. Wood slats strung on metal cables form the curtain of wood rolling doors.

Rolling Fire Doors are labeled by Underwriters' Laboratories, Inc., for fire walls, etc., and carry a 3 hour test label.

Cornell Iron Works, Inc., are the originators of the Rolling Grille in America. Cornell Rolling Grilles operate like rolling doors, but they do not block light, air, or vision. They have been widely accepted for school corridors, etc. Can be completely concealed when open. Rolling Grilles are made of 5/16" round hard drawn galvanized steel bars running continuous horizontally from jamb to jamb and locked into rolled steel vertical side guides. The horizontal bars are flexibly connected by unbreakable vertical steel links; permitting entire grille to coil overhead.

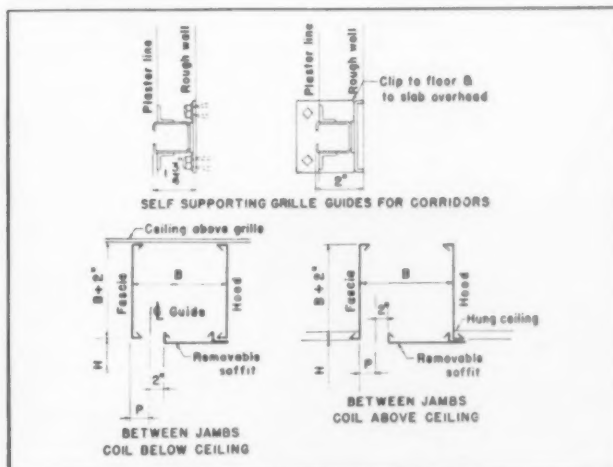
Patented Locking Device for Rolling Grilles is workable from either side.



Close-up view of ROLLING GRILLE curtain, CORNELL Standard Butterfly Type



CORNELL ROLLING GRILLE in school corridor, Kansas. Side guides and overhead coil are concealed in jambs and ceiling



CORNELL ROLLING STEEL GRILLES closing off stairways, New York City Public School



# THE KINNEAR MANUFACTURING CO.

1760-80 Fields Ave., Columbus 16, Ohio

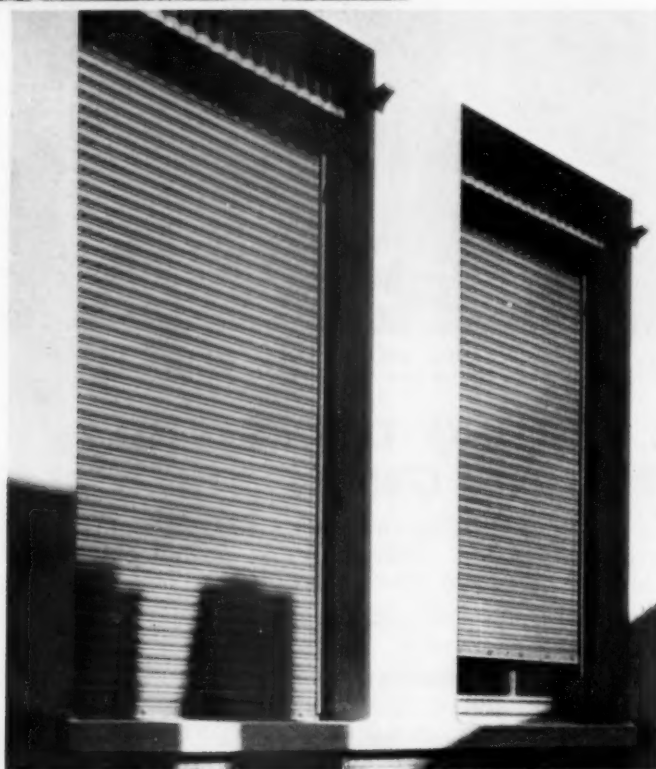
## FACTORIES

1760-80 Fields Avenue  
Columbus 16, Ohio

1742 Yosemite Avenue  
San Francisco 24, Calif.

**BRANCH OFFICES** in New York, N. Y.; Chicago, Ill.; Boston, Mass.; Philadelphia, Pa.; Detroit, Mich.; New Orleans, La.; Cleveland, Ohio; Cincinnati, Ohio; Baltimore Md.; Pittsburgh, Pa.; and Washington, D. C.

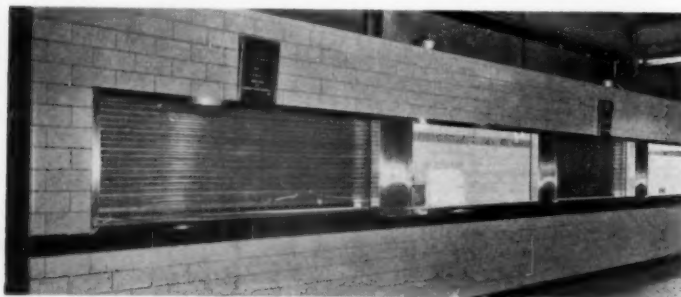
## KINNEAR ROLLING DOORS and GRILLES



Underwriters Labeled Fire Doors — Suited also for Service Use

**PRODUCTS**—Wood or Steel Rolling Service Doors, Automatic Fire Doors and Shutters, Metal Rolling Grilles, Wood Rolling Partitions and Wood or Steel Upward-Acting Doors.

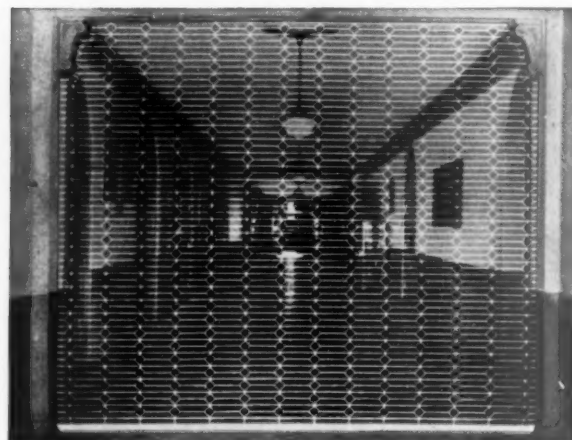
**GENERAL**—The Kinnear Manufacturing Company pioneered and have devoted their entire effort for the past half century to Rolling or Upward-Acting type Doors and Grilles. They have established the reputation throughout the world as specialists in doors that save floor and wall space, operate more conveniently, reduce maintenance expense through unusual durability and that can be built for old or new buildings for inside or outside use.



Ideal for closing of lunch counters, etc.

## Service Doors or Labeled Automatic Fire Doors for doorways or windows

Kinnear Rolling Doors are composed of a metal curtain which coils above the lintel, similar to a window shade. They can be installed either on the face of the wall or between the jambs when concealment of the mechanism is desired. Springs provide perfect counterbalance. They can also be operated manually, mechanically, or electrically. Kinnear Fire Doors, though suitable for service purposes, are "labeled" and equipped with mechanism for automatic closure in case of fire. To insure maximum fire protection they are equipped with an auxiliary push-down spring to insure positive closure; a governor for controlling speed of curtain closure; and other features in excess of the requirements of the Underwriters' Laboratories. Their superior design has proved its worth in many major conflagrations.



Grilles for closing corridors to the public

**METAL ROLLING GRILLES**—Operating on the same principle as the Rolling Door, the Kinnear Rolling Grille is a permanently installed and attractively designed barrier that is remarkably strong when closed and locked, but out of sight when opened. When down, it admits air and light, and does not obstruct vision, making it particularly applicable to all types of interior and exterior openings as well as hallways in school buildings. The grille proper is artistically designed of steel bars spaced close enough to prevent the admittance of large projectiles or a man's hand. The Kinnear Rolling Grille may be mounted on the face of the wall with brackets and coils entirely above the bottom of the lintel and with edges of guides flush with the face of opening jambs; or where headroom is limited and grille cannot be installed on the face of the wall it may be mounted in the opening.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# UNITED STATES PLYWOOD CORPORATION

Executive Offices: Weldwood Building, 55 West 44th Street, New York 18, N. Y.

BRANCHES IN PRINCIPAL CITIES THROUGHOUT THE COUNTRY

## *for modern schools —* **WELDWOOD\* DOORS**

**Weatherproof**

**Moderately Priced**

**Easily Maintained**

**Permanently Beautiful**

**Lightweight**

**Dimensionally Stable**



*Birch Weldwood Doors in the University of Miami Dormitory, Miami, Florida. Robert L. Weed and Marion Manley, Architects.*

THE smooth, clean lines of modern school structures call for doors that are an integral part of the design. They must be uncluttered in appearance, they must perform their function efficiently, with a minimum of effort in operation as well as maintenance. Apart from their purely practical advantages, doors must have the added quality of lasting beauty.

To meet the specialized needs of schools and universities we have developed a line of high quality Weldwood Doors. They fill the requirements of the most discriminating architects and designers.

**WELDWOOD LUMBER STAVED CORE DOOR**—This is a moderately-priced flush door recently added to the Weldwood line. It is ideal for school use, will withstand long continuous service and remain as beautiful as the day it was first installed. The solid lumber core means it can be hung from either side, custom-cut openings are easily made. Available in all the most popular woods for either exterior or interior use.

**WELDWOOD FIRE DOOR**—This is the *only* wood-faced fire door which bears the Underwriters' label and is approved by them for Class B openings. Made with a fireproof mineral core, faced with fine wood veneers, these flush doors are as beautiful as they are safe—a must for both interior and exterior openings in all fireproof school and university buildings.

**WELDWOOD STANDARD MINERAL CORE DOOR**—An excellent interior and exterior flush veneer door similar to the Weldwood Fire Door but without fireproofed edge banding. Like the fire door they are so light in weight a small child can open and close them easily, yet they can take hard use and abuse. They will not swell in summer or shrink in winter. Made with a variety of fine hardwood faces.

### **Other Products for School Construction and Remodeling**

**HARDWOOD WELDWOOD PANELS**—These are available in wood faces to match or complement Weldwood Doors. For walls and furniture, Cabinet and Architectural grades to meet every requirement, in thicknesses of  $\frac{1}{4}$ " to  $1\frac{3}{16}$ ", panel widths up to 4' lengths up to 8' in average stock panels. Longer panels obtainable. Architectural Weldwood can also be made to specification from veneer flitches selected by the architect. Exterior grade panels are also available.

**DOUGLAS FIR WELDWOOD**—Is made in both interior and exterior types in a complete variety of grades, sizes and thicknesses. Use this versatile material for sheathing, sub-flooring, roof decking, concrete forms and general utility. Insist on Weldwood—made by the World's largest manufacturer of plywood.

**KALISTRON \***—For walls and upholstery. Highly wear-resistant plastic sheeting with color permanently fused to the underside and protected with a suede-like backing. Embossed to produce the effect of top grain leather. Tough but pliable. Easy to clean. Tailors easily. Made in rolls approximately 54" wide, 100' long, in all wanted colors.

**MICARTA \***—For table and counter tops, kitchen, bath and lavatory walls. A high pressure plastic laminate of exceptional serviceability made by Westinghouse. Non-chipping, non-absorbent, stain-resistant. Will not crack or warp. Soap-and-water cleanable. In non-fading colors and patterns, also available in wood veneer faces. Made in  $1/16$ " thickness for application to other surfaces, and in table and counter top panels already mounted on plywood  $\frac{3}{8}$ " and  $1\frac{1}{4}$ " thick.

\* Reg. U.S. Pat. Off.

**Complete details on these and allied products available on request**

**THE AMERICAN SCHOOL AND UNIVERSITY—1950-51**

# INTERNATIONAL BRONZE TABLET CO., INC.

Manufacturers of

Memorials • Testimonials • Honor Rolls • Door Plates • Building Signs • Gift Markers  
150-154 West 22nd Street, New York 11, N. Y.

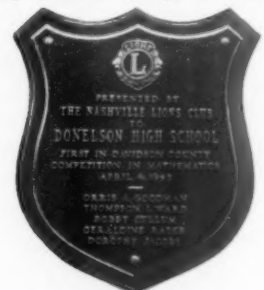
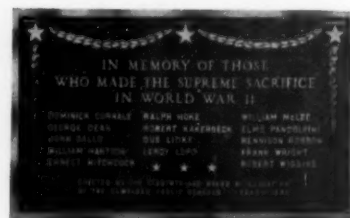
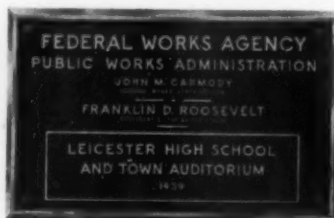
## FREE to Schools on request . . .



## CATALOG of suggestions for BRONZE TABLETS

THIS handsome booklet of 48 pages contains more than 150 designs, both standard and custom. You will find helpful suggestions for every kind of school requirement. Write for Catalog A—it will be mailed promptly without charge or obligation.

INTERNATIONAL BRONZE tablets are of the finest genuine solid bronze, made by skilled craftsmen, and painstakingly hand finished. We gladly submit full size sketches in color, with estimates, entirely without obligation. Simply give us the approximate size and wording, and any information you believe will be helpful.





# JAS. H. MATTHEWS & CO.

## Memorial Bronze DIVISION

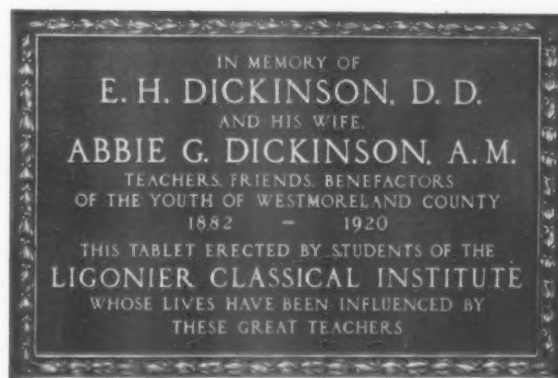
1319 WEST LIBERTY AVE.

PITTSBURGH 26, PA.

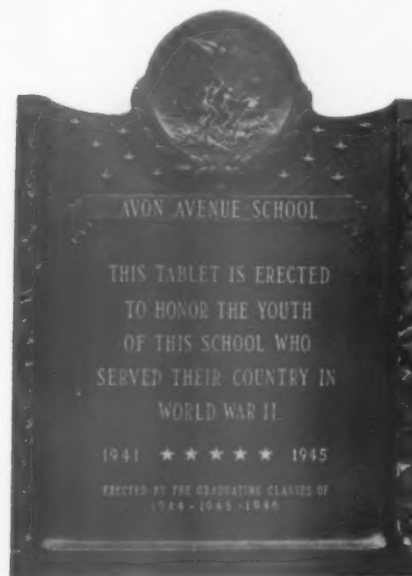
**PRODUCTS . . .** Academic Tablets • War Memorials • Honor Rolls • Testimonial Plaques •  
Bas-Relief Portraits • Intaglio Portraits • Building Signs • Entrance Signs •  
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• The LAUREL LIBER Design; standard pattern 23 $\frac{1}{4}$ " x 17". Particularly suited with famous quotation, as shown. A distinctive class gift to its Alma Mater!



• The Union Design; standard patterns ranging from 24" x 12" up to 30" x 24", but available any size. Particularly appropriate for memorializing outstanding educators. Lamp and Book emblem, symbolic of teaching profession, may be included; or bas-relief likeness of the honored individual.



• The IWO JIMA Design; available 18" x 24" or 26 $\frac{1}{2}$ " x 40". Especially designed as World War II Honor Roll. May be used with general inscription as shown; or with individuals' names (up to 40 in number). Other designs available for larger lists.

Hundreds of standard designs from which to choose; sketches and drawings by our skilled Art Department. Just write us your problems; tell us all you feel we should know (if Honor Roll, how many names to be listed). Special memorials for school use: Lincoln's Gettysburg Address (with bas-relief); Preamble to Constitution; Bill of Rights. Write for quotations—priced surprisingly low, yet highest quality of material and workmanship

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

**T. F. McGANN & SONS CO.**

24 Village Street  
Somerville 43, Mass.

# BEAUTY EVERLASTING

*In Academic Memorials by McGann*



For deeds that shall live in their virtue, no more fitting tribute can be bestowed than

## BRONZE MEMORIALS

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Particularly for academic memorials, McGann craftsmanship wrought thru three generations, befits the distinctions earned by those whom you wish remembered.

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ARCHITECTURAL

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## TABLETS

## IN BRONZE

ART

BRONZE

## FOUNDERS

**SINCE 1869**

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# THE MICHAELS ART BRONZE CO., INC.

Second and Court, Covington, Ky.

## PRODUCTS

Bronze Tablets and Signs • Bronze Doors and Case-ment Windows • Name Plates • Office and Light- ing Fixtures • Bulletin Boards • Building Direc- tories • Railings • Desk Sets • Lamp Standards • Grilles and Wickets • Radiator Grilles • Kick and



## PRODUCTS

Push Plates • Push Bars • Time-Tight Exhibit Cases • MI-CO Parking Meters • Cast and Ex- truded Thresholds • Wire Work (Partitions, etc.) • Marquise, and many other ferrous and non-ferrous metal products.

Michaels Bronze Tablets and Signs are manufac- tured in a wide variety of designs, shapes and sizes to meet all school and college requirements. A few are illustrated below. Bronze, virtually indestructible, is the ideal metal for permanent memorials. It lends itself readily to the hands of skilled craftsmen and be- comes more beautiful as time goes by. Many designs

may be furnished from standard patterns or modeled to your specifications. Just tell us the size, the pur- pose of the tablet, and the wording to be used. We shall be glad to submit sketches and quote prices. When necessary, additional blueprints will be fur- nished for approval. Fully illustrated folder will be sent on request.



Laurel design with contoured top. Bears intaglio portrait. Tablet size 21 $\frac{3}{4}$ " x 23 $\frac{3}{4}$ ".



Bronze name plates in any size, with or without title.



Perpetuate in everlasting bronze, the memory of those who sacrificed their lives that our nation might remain free. Illustrated above is one of many stand- ard honor rolls produced by Michaels. If desired, plaques will be designed to meet your requirements.

Bronze Tablets commemorate the construction of buildings or perpetuate the memory of public servants and bene- factors who dedicated their lives to the service of mankind. Many designs, plain and ornate, in sizes to meet your requirements, are available.

## Michaels Time-Tight Exhibit Cases with Innerlocking Frames



Michaels Table Cases, Wall Cases, Aisle Cases, Suspended Cases, Re- cessed Cases, or Special Cases are man- ufactured with either extruded bronze or aluminum frames, and all have Michaels' exclusive innerlocking fea- ture. Satin finish is standard, but if desired, electroplated or polished fin- ishes may be supplied. Frames take full  $\frac{1}{4}$ " polished plate glass. Shelves of glass,  $\frac{1}{4}$ " or  $\frac{1}{2}$ ", depending on weight requirements, have all four edges pol- ished. Shelf supports are adjustable every inch. Paracentric locks are stand- ard in all locked cases. No screws are exposed on the face of frames except where necessary for removable or

hinged panels. If illumination is neces- sary, it will be the latest and best type. Illustrated folder giving complete speci- fications will be sent on request.





# ACCURATE METAL WEATHER STRIP CO., INC.

218 East 26th Street, New York 10, N. Y.

DISTRIBUTORS IN PRINCIPAL CITIES THROUGHOUT THE UNITED STATES

Efficient Weatherstripping for all types of wood and metal windows and doors.

Various types and sizes of "ACCURATE" METAL WEATHER STRIPS places us in an ideal position to cooperate with school Architects and Executives in meeting their requirements.

**TYPES AND QUALITY OF MATERIALS:** Zinc and Bronze materials are ordinarily used depending upon atmospheric conditions.

**THE COMPANY:** The "ACCURATE" METAL WEATHER STRIP COMPANY has been manufacturing metal weather-strips for 40 years and today it is outstanding in the industry.



**MANUFACTURING FACILITIES:** Owing to unusually efficient manufacturing facilities, personal supervision and complete control of every step in fabrication, purchasers of "ACCURATE" METAL WEATHER STRIPS are assured of prompt service and dependable workmanship.

**ARCHITECTURAL SERVICE:** Satisfactory results from weather strip depends upon three major factors:—(1) quality of equipment, (2) selection of equipment designed to meet the individual conditions and requirements, and (3) proper installation. Where time permits, we strongly urge that you permit us to submit complete and specific recommendations.

## "ACCURATE" SERIES NO. 30 EQUIPMENT RECOMMENDED FOR SCHOOL WINDOWS

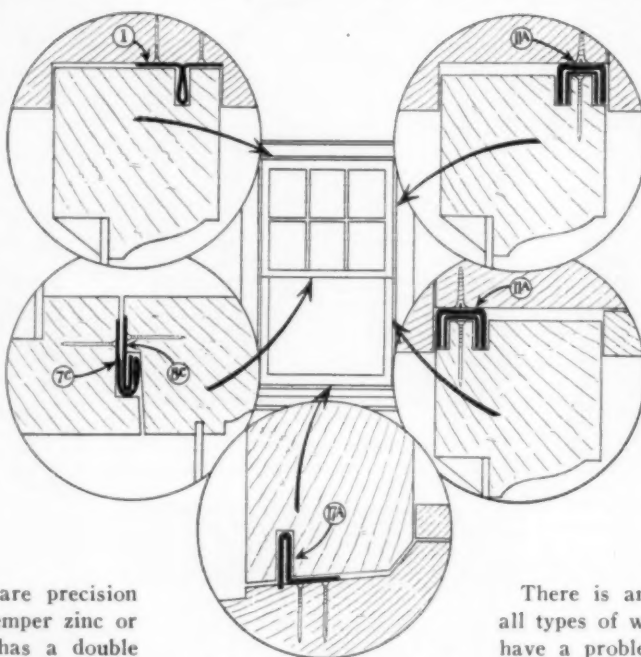
Heavy Double Hung School Windows Require Substantial Weather Strips

Large double hung windows such as those used in schools require a weather strip designed especially for this type and size of window. It is a waste of money to specify a light weight strip which is not designed for this type of heavy-duty service.

### "Accurate" Series No. 30 Equipment

This series is designed especially for schools. It will stand up and take considerable abuse due to its shape and the heavy gauge metal used in its manufacture.

All parts of the equipment are precision made of heavy gauge special temper zinc or solid bronze as specified. It has a double metal to metal channel slide on the vertical



SERIES NO. 30 EQUIPMENT

edges of sash. The channel on the pulley stile is a heavy 16-gauge channel in which the sash channel slides. As the channels operate metal to metal, they have to operate perfectly as there is no chance for the mechanic to install them in any other way.

It will always hold its contact if applied with screws and not nails.

The narrow channel makes it possible to get to the sash weights easily. If it is necessary to remove the channel, it is rigid enough to hold its shape and can be replaced in the same position by using the same screw holes.

### For Other Types of Windows

There is an "Accurate" weather strip for all types of wood or metal windows. If you have a problem, write to us for the proper weather strip for the condition.

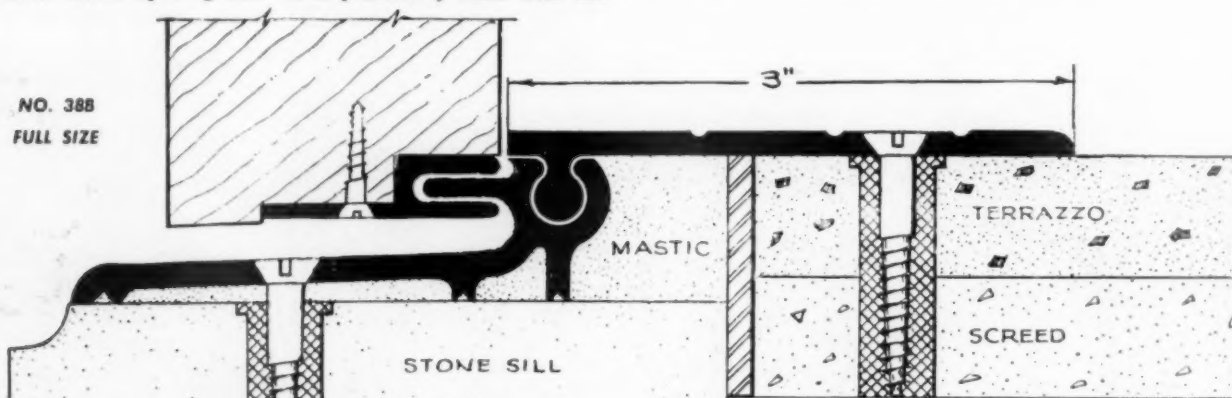
## ONE OF MANY TYPES OF ACCURATE EXTRUDED BRONZE SADDLES

"Accurate" also specializes in extruded bronze door saddles. Each saddle is designed for a specific condition and a saddle can be selected for practically any door condition.

"Accurate" No. 38B extruded bronze saddle is designed for exterior doors opening out. It is practically flush with the

floor and its flat top surface does not interfere with the use of panic bolts.

A complete series of saddles for use with exterior sliding doors will be found in our catalog in Sweet's.





LABORATORY, MCKINLEY SCHOOL • WYANDOTTE, MICHIGAN

Jenson & Keough, Architects

*This is*  
**MOSAIC**  
*tile*

GYMNASIUM, ADRIAN HIGH SCHOOL • ADRIAN, MICHIGAN

Warren S. Holmes Co., Architects



# there are 4 types of MOSAIC tile

"Tile is timeless—Mosaic is matchless"—is truly a modern statement of an almost ageless art. In ancient days, as now, tile meant durability, beauty and the ultimate in good taste.

**1 MOSAIC WALL TILE**—Carefully blended clay body, surfaced in ceramic glaze in varying degrees of gloss from Satin Matt to Bright Enamel. Mosaic wall tile combines permanent finish, lasting beauty and durability not available in other wall-surfacing materials.

**USES:** Wainscoting for bathrooms, showers, other interior wall surfaces, operating rooms, powder rooms, corridors, lunchrooms, closets, wash-rooms, locker rooms, drainboards.

**2 MOSAIC FLOOR TILE**—Unglazed, porecelain-type tile in a variety of integral colors and in "Granitex"—a natural clay type distinguished by an interesting stippled color variation and texture. Called Ceramic Mosaics, this tile is available also in a non-slip type.

**USES:** Floors in bathrooms, showers, swimming pools, decks, curbs; vestibules and corridors, porches, laundry rooms, stores, garages, walls where attractive patterns and colors are desired.

**3 MOSAIC'S "CARLYLE" QUARRY TILE**—An extremely durable tile, especially suitable for floor use and heavy-duty purposes, both indoors and out. Easy to clean, permanent, weatherproof, impervious to moisture, grease and stains. The Carlyle method makes possible a beautiful range of colors which can be arranged to give striking effects.

**USES:** Quarry tile is used extensively for kitchen installations in hospitals, hotels, busy restaurants, breweries and research laboratories. It is also widely used for porches, vestibules, living room and dining room floors; floors of patios and for garden walls; walls of stair wells and recreation rooms.

**4 MOSAIC FAIENCE TILE**—Faience is a specially-crafted tile which has a modest irregularity in its surface and outline, as well as in the color and texture of the glazes. There is character, individuality . . . a certain depth of quality that makes Mosaic Faience distinctive. Interesting treatments are possible with versatile, weatherproof Faience.

In addition to square units, standard items include octagons, hexagons, elongated hexagons, pentagons, fish scales and many other shapes. Special sizes and shapes in Faience are given particular attention.

**USES:** Wainscoting (indoors and out), store fronts, building exteriors, fountains, pools, subway entrances and stations, vestibules, mantels, decorative panels and plaques.

the **HARMONITONE** line

is a new  
range of **36** related colors

in distinctive **MOSAIC** wall tile

#### PALETTE OF RELATED COLORS

Mosaic now makes available a new harmonic palette that permits the arranging of a color scheme to meet the most varied requirements. Years of careful research and development have gone into the HARMONITONE color line. It was developed with a definite relationship among the colors—to give the greatest possible latitude when combining them in use.

As a result, any single color shown in the HARMONITONE color guide on the right has been chosen to relate harmoniously with any *other* color in the palette. And now it is possible, for the first time, to develop tile treatments for floors and walls with the assurance of perfect color harmony. For any wall color harmonizes with any floor color. You can select two, three or more colors—all go together beautifully.

GLAZED **WALL TILE** COLORS 6" x 6", 4 1/4" x 4 1/4", 6" x 3"

101	121	141	161	181	201
102	122	142	162	182	202
103	123	143	163	183	203

CERAMIC MOSAIC **FLOOR TILE** COLORS furnished in usual Ceramic Mosaic sizes

10 light	12 light	14 light	16 light	18 light	20 light
10 dark	12 dark	14 dark	16 dark	18 dark	20 dark



## FREE HELPFUL MOSAIC BOOKLETS

Helpful Mosaic specification data, application information, and the booklets illustrated will be sent to you free of charge. In addition, The Mosaic Tile Company maintains a staff of competent designers who are always at the service of architects, builders and owners. Colored sketches, full-size samples and technical information are available upon request. This Mosaic service is given gladly.

## MOSAIC'S NEW, EASY-TO-USE HARMONITONE COLOR CHART

The color panel illustrated here helps you with your design planning. Start with the color you have in mind for a project, then see how it harmonizes with any *other* color. You will then get an instant picture of the many combinations that are possible . . . can visualize the *completed* project right from the beginning, confident that the finished job will be color-correct.

Whether you plan school building or remodeling, be sure to see the beautiful, versatile, durable Harmonitone Line before you buy.

## FOR YOUR REFERENCE

Folders  
containing —  
Application  
Information —  
Trim Chart —  
Accessories —  
Ceramic,  
Granitex  
and Faience  
Mosaic Catalog  
(including design  
suggestions)

1	201	221	241	261	281	301	304
2	202	222	242	262	282	302	244
3	203	223	243	263	283	303	104
light	20 light	22 light	24 light	26 light	28 light	30 light	Red
dark	20 dark	22 dark	24 dark	26 dark	28 dark	30 dark	Chocolate



# MOSAIC "Carlyle" quarry tile



RECREATION ROOM, THOMAS STREET SCHOOL  
LANSING, MICHIGAN

Warren S. Holmes Co., Architects



CORRIDOR, THOMAS STREET SCHOOL  
LANSING, MICHIGAN

Warren S. Holmes Co., Architects



Rich in color, moderate in cost, Mosaic's "Carlyle" Quarries are impervious to moisture, stains and dirt. They are particularly successful in floors and in areas where a pattern featuring the equipment of the room or the lanes of traffic is required. Mosaic Quarries are machine-made from plastic natural clays by de-airing and the extrusion processes.

**USES:** Installations in the lobbies of post offices and public buildings, dairy plants, breweries, power plants, corridors, kitchens, toilets, terraces, porches, solariums, recreation rooms, patios or any other spaces where floors are subject to hard usage.

**SIZES AND SHAPES:** All standard sizes and shapes from 2 3/4" x 2 3/4" x 3/4" thick to 9" x 9" x 1 1/8" thick. All colors are also available in the trim units. (Send for folder showing complete line of trimmers.)

MOSAIC TILE is manufactured by

THE **MOSAIC** TILE COMPANY

(Member, Tile Council of America)

GENERAL OFFICES: ZANESVILLE, OHIO  
REPRESENTATIVES IN PRINCIPAL CITIES

Printed in U. S. A.

Form No. 135-OP-16500-3-50

# NATIONAL FIREPROOFING CORPORATION

General Offices: 327 Fifth Avenue, Pittsburgh 22, Pa.

BRANCHES: New York (17), 205-17 East 42nd Street • Chicago (6), 205 W. Wacker Drive • Philadelphia (2), 1518 Walnut Street • Detroit (8), 5737 Commonwealth Avenue • Boston (16), 20 Providence Street • Syracuse (10), 225 Kensington Place • North Birmingham (7), Ala.

IN CANADA: National Fire Proofing Company of Canada, Ltd., Toronto, Ontario

## NATCO GLAZED STRUCTURAL FACING TILE



for Interior Walls Partitions and Wainscots

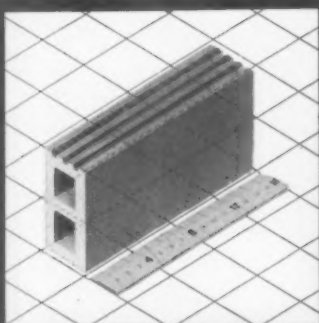


NATCO GLAZED STRUCTURAL FACING TILE (BLOCK BOND — 8 W SERIES) WAS USED IN THE CORRIDOR OF ST. THERESA SCHOOL, HOUSTON, TEXAS. Goleman and Rolfe, Architects; Fretz Construction Company, Contractors. Natco Tile supplied by Acme Brick Company.

NATCO GLAZED STRUCTURAL FACING TILE build interior school walls that can "take" hard service and abuse and come through year after year

### MODULAR COORDINATION

Tile and 16 inch ruler are laid below on grids made up of 4 inch squares. The 4 inch module unit of measure is the basis of modular coordination for all building materials and equipment.



unscathed and unmarred. They are strong, fire-safe and sanitary. Their bright cheerful surfaces need no maintenance except occasional soap and water. Their attractive color and architectural beauty fit in perfectly with the general design and planning of school buildings. Economical to erect, too, because of minimum cutting and wastage on the job. The ceramic glazes are of highest quality. They are high-fired-burned at temperatures of approximately 2000°F. The salt glazed tile are furnished in desirable mingled light buff shades.

There is a particular type of Natco Structural Clay Tile for all kinds of load bearing and non-loadbearing walls and for fire-resistive floors and roofs. Natco Structural Clay Tile for floors are fireproof, sound-resisting and are unaffected by water and acids. Write for Natco literature.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



# UNITED STATES QUARRY TILE CO.

Member: Tile Council of America

General Offices: 217-L Fourth St., N. E., Canton 2, Ohio

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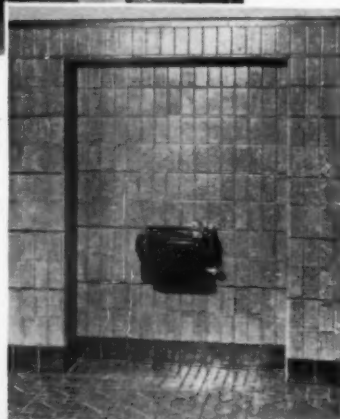
## PRODUCTS

**Romany Glazed Wall Tiles** are buff body tiles for interior use, manufactured in a variety of colors and in sizes and shapes based upon  $4\frac{1}{4}'' \times 4\frac{1}{4}''$  and  $6'' \times 6''$  standards with trim. See our more complete catalogue for list of colors, sizes and shapes.

**Romany Glazed Floor Tiles** are red body tiles with hard finish matt glazes. Sizes and colors are similar to above.

**Romany Red Body Glazed Tiles** are suitable for either interior or exterior use where a heavy duty glazed tile is required.

**Romany Tunnel Tiles** are enduring red body glazed tiles with special bonding back.



for  
FLOORS  
WALLS  
TOILETS  
SHOWERS  
KITCHENS

CAFETERIAS  
AUDITORIUMS  
CORRIDORS  
FOYERS  
FOUNTAINS

## FREE CATALOGUE

Catalogue of more detailed information and illustrations of helpful suggestions will be sent free upon request. Please address requests to our Canton office.



## ROMANY STANDARD WALL TILE COLORS

No. 217	GREEN
No. 225	BLUE
No. 243	YELLOW
No. 264	GREY
No. 273	WHITE
No. 284	SUNTAN
No. 286	PEACH
No. 311	GREEN
No. 320	GLAUCOUS
No. 321	BLUE
No. 331	PINK
No. 357	BLACK
No. 846	OATMEAL
No. 73	WHITE
No. 714	GREEN
No. 722	BLUE
No. 727	ROYAL BLUE
No. 730	PINK
No. 737	BURGUNDY
No. 741	LIGHT CITRUS YELLOW
No. 742	PALE YELLOW
No. 746	LIGHT YELLOW
No. 748	DARK YELLOW
No. 759	BLACK
No. 763	GREY
No. 780	LIGHT COFFEE
No. 782	DARK COFFEE
No. 784	SUNTAN
No. 786	PEACH
No. 787	BROWN



## TILE-TEX ASPHALT TILE FLOORING IN SCHOOLS



CLASSROOM, PEABODY DEMONSTRATION SCHOOL, NASHVILLE, TENN.

**THE TILE-TEX DIVISION**  
**THE FLINTKOTE COMPANY**  
1232 McKinley Avenue  
CHICAGO HEIGHTS, ILLINOIS

## TILE-TEX ASPHALT TILE FLOORING

### A Time-Tested School Flooring

Tile-Text Asphalt Tile is an asbestos-asphalt composition tile flooring, which has been used for twenty years in schools throughout the United States. Tile-Text Asphalt Tile floors give uniformly good service, represent on the average a low investment cost per square foot, and are maintained simply and economically. They represent what we honestly believe to be the greatest value in floors for schools that can be purchased today.

Tile-Text Asphalt Tile is designed and manufactured to meet the demand for a low cost flooring, installed in tile size units, that will withstand heavy foot traffic under exacting conditions over a long period of years. Prominent school architects throughout the nation specify Tile-Text Asphalt Tile consistently and know from experience that the company manufacturing it can be relied upon to stand behind the material and improve it year after year.



CLASSROOM, RIVERHEAD HIGH SCHOOL, RIVERHEAD, N. Y.

### Ideal for Work or Play

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

On these pages are photographs showing Tile-Text Asphalt Tile in use in many of the various types of areas found in schools today. Tile-Text Asphalt Tile is often specified because of this versatility and adaptability to a wide variety of uses. It is manufactured in a great variety of sizes and colors, enabling the creation of designs to suit almost any color scheme and design objective. Hundreds of Tile-Text Asphalt Tile installations in schools throughout the country are mute testimony to the quality of the product and the knowledge and skill of the Tile-Text Asphalt Tile contractors who install it.

Constructive criticism and suggestions on the part of school executives are always welcomed by the company, which is constantly ready to help in the solution of any problems connected with school floors.

### Low Maintenance Cost



LOUNGE, WILLARD HALL, NORTHWESTERN UNIVERSITY, EVANSTON, ILL.



# TILE-TEX ASPHALT TILE FLOORING



THE ATTRACTIVE TILE-TEX ASPHALT TILE FLOOR SHOWN BELOW LENDS CHARACTER AND DISTINCTION TO THIS LIBRARY

**Durable  
Sanitary  
Attractive**

TILE-TEX ASPHALT TILE FLOORS ARE SAFE, ATTRACTIVE, DURABLE, AND EASY TO CLEAN. THESE CHARACTERISTICS ARE PARAMOUNT IN SCHOOL CORRIDORS



**"Foot-easy"**

THIS HOME ECONOMICS ROOM FLOOR IS COMFORTABLE UNDER FOOT AND HAS A SANITARY, EASY-TO-CLEAN SURFACE

# TILE-TEX ASPHALT TILE FLOORING

## Meets Requirements in All Areas

Tile-Text Asphalt Tile possesses the necessary performance characteristics required for school corridors, classrooms, restrooms, auditoriums, libraries, science rooms, cafeterias, and offices. Tile-Text Asphalt Tile combines comfort under foot with the ability to withstand severe traffic and give many years of satisfactory service. Inherently moisture-resistant, Tile-Text Asphalt Tile is successfully installed in areas on and below grade over concrete sub-floors. When unwaxed, Tile-Text provides a safe, sure footing on which to walk and work. Its smooth, closely textured surface is easy to keep clean and sanitary. The asbestos content of Tile-Text Asphalt Tile makes it substantially incombustible and places it high in the ranks of resilient flooring as to fire resistance.

Tile-Text Asphalt Tile is available in thirty-two plain and marbled colors. Careful designing of these colors enables the judicious selection of colors to meet specific requirements of each school area.

Tile-Text Asphalt Tile is manufactured in two thicknesses, 1/8" and 3/16", and in the following sizes: 4 1/2 x 9 in., 6 x 6 in., 6 x 12 in., 9 x 9 in., 12 x 12 in., 12 x 24 in., and 18 x 24 in. To supplement these sizes and permit modern, striking designs, there are available feature strips in multiples of 1/2 in., from 1 in. to 3 in. Special decorative inserts for achieving individuality of design are also obtainable.

## Partial List of School Installations

The Franklin D. Roosevelt High School, Bremerton, Washington  
 Cornish School, Seattle, Washington  
 Lake City Grade School, Seattle, Washington  
 Newburyport High School, Newburyport, Massachusetts  
 Duxbury High School, Duxbury, Massachusetts  
 Davol School, Fall River, Massachusetts  
 Bowditch School, Salem, Massachusetts  
 Providence St. School, Worcester, Massachusetts  
 Howard University, Washington, D. C.  
 Georgetown University, Washington, D. C.  
 Lee Jackson School, Fairfax County, Virginia  
 St. Paul's Academy, Washington, D. C.  
 Leland Junior High School, Bethesda, Maryland  
 Catonsville High School, Catonsville, Maryland  
 Johns Hopkins University, Baltimore, Maryland  
 St. Mary's High School, Akron, Ohio  
 Akron University, Akron, Ohio  
 Barbarton High School, Barbarton, Ohio  
 Boy's Catholic High School, North Side, Pittsburgh, Pennsylvania  
 The Cranbrook School, Detroit, Michigan  
 York School, Dearborn, Michigan  
 University of Detroit, Detroit, Michigan  
 University of Michigan, Ann Arbor, Michigan  
 Dominican High School, Detroit, Michigan  
 University of Pittsburgh, Pittsburgh, Pennsylvania  
 Carnegie Tech, Pittsburgh, Pennsylvania  
 Toledo University, Toledo, Ohio  
 Del Barton School, Morristown, New Jersey  
 Sacred Heart Academy, Stamford, Connecticut  
 Holy Trinity School, Brooklyn, New York  
 Blair Academy, Blairstown, New Jersey

Mt. Carmel School, Utica, New York  
 Mattituck School, Mattituck, New York  
 Port Washington High School, Port Washington, New York  
 New York University, New York, New York  
 Ethel Walker School, Simsbury, Connecticut  
 Washington Irving High School, New York, New York  
 St. Vincent's School, Buffalo, New York  
 Scarsdale High School, Scarsdale, New York  
 University of Connecticut, Storrs, Connecticut  
 Point Loma Junior High, San Diego, California  
 San Diego Army-Navy Academy, Carlsbad, California  
 Grossmont Union High, Grossmont, San Diego County, California  
 El Monte Union High School, El Monte, California  
 Thomas A. Edison School, Long Beach, California  
 Huntington School, San Marino, California  
 Riverside Drive School, Van Nuys, California  
 United Township High School, East Moline, Illinois  
 Milan Public School, Milan, Illinois  
 Augustana College and Theological Seminary, Rock Island, Illinois  
 University of Illinois, Champaign, Illinois  
 Illinois Institute of Technology, Chicago, Illinois  
 George Williams College, Chicago, Illinois  
 Hinsdale Township High School, Hinsdale, Illinois  
 Bloom Township High School, Chicago Heights, Illinois  
 University of Florida, Gainesville, Florida  
 Florida State Teachers, Tallahassee, Florida  
 Emory University, Emory, Georgia  
 Louisiana State University, New Orleans, Louisiana  
 University of Oklahoma, Norman, Oklahoma  
 Washington University, St. Louis, Missouri

**THE TILE-TEX DIVISION**  
**THE FLINTKOTE COMPANY**  
 1232 McKinley Avenue  
 CHICAGO HEIGHTS, ILLINOIS

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# AMERICAN ABRASIVE METALS CO.

IRVINGTON 11, N. J.

Offices in Principal Cities

NON-SLIP PRODUCTS FOR STAIRWAYS AND FLOORS

## FERALUN\*—NON-SLIP TREADS, NOSINGS and SADDLES



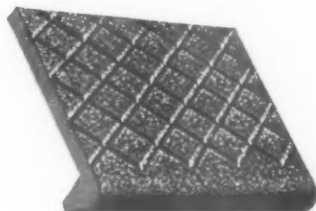
Day in, day out, unnumbered scuffling feet find underfoot safety on Feralun. Wet or dry, going up or down, they do not slip—and Feralun wears like the "iron" it is.

Approved by insurance companies and specified by school architects, Feralun has long been the accepted standard safety tread for schools and other public buildings. Made of cast iron with wear-resistant abrasive particles embedded in the walking surface, Feralun\*\* provides a sure-footed "grip" that keeps feet from slipping—wet or dry—and requires no maintenance.

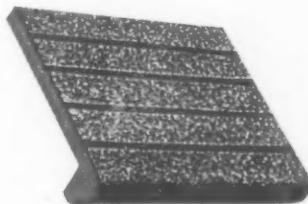
Feralun treads are made in three surfaces—hatched, fluted or plain—and are available as full treads or nosings. Each surface design provides equally effective underfoot safety since Feralun's non-slip properties depend upon the abrasive particles and not upon the surface design. Cast to fit, Feralun is quickly installed and is equally adapted to new or repair installations. Write for complete information, or see our catalog in Sweet's Architectural, Sec. 13a.

10

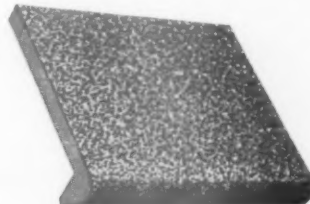
\*\* Available also in Bronze, (Bronzalun), Aluminum (Alumalun), and Nickel-Bronze (Nicalun)



FERALUN HATCHED



FERALUN FLUTED

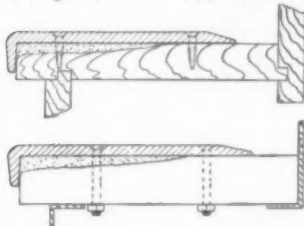


FERALUN PLAIN

### How to Make Old or Worn Stairs Safe . . . with FERALUN\*



Feralun stair treads repair badly worn stairs and eliminate further maintenance. (See photo and sketches below.) Style A long lip 1" to 1 1/4" deep covers worn nosing sections. Apply Feralun treads on any material and fasten with wood screws, plugs, bolts, or expansion shields. (Usual margins are 2" to 3" from ends to stringers; 1" to 1 1/2" between back edge of Feralun tread and the riser.)



### FOR SAFE FOOTING IN INDUSTRIAL ARTS DEPARTMENTS . . . FERROX\*

To reduce slipping hazards on floor areas around machines, where oil and sawdust gather, use FERROX Troweling Composition. Write for details and free, illustrated literature.

\*Reg. U. S. Pat. Off.



# AMERICAN MASON SAFETY TREAD CO.

Lowell, Mass.

REPRESENTATIVES IN PRINCIPAL CITIES OF THE UNITED STATES AND CANADA

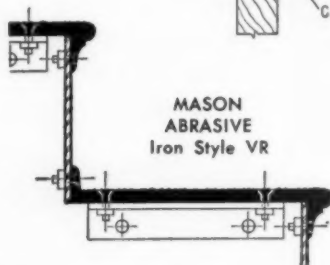
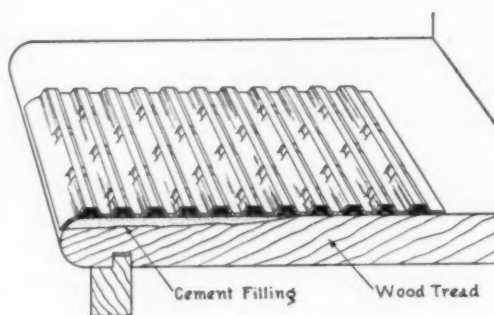
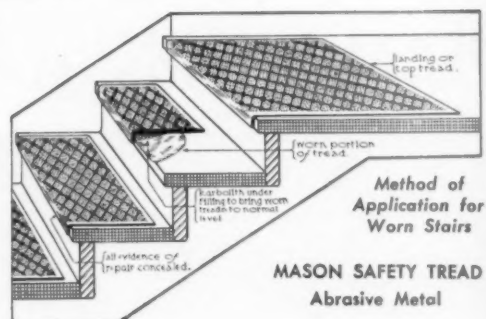
## MASON SAFETY TREADS

**Abrasive Metal—Ribbed Type—Universal**

**For Stairways • Stair Landings and Ramps**

**Over Fifty Years of Service to  
Educational Institutions**

For years *Mason Safety Treads* have filled a very definite need in preventing accidents on stairways, entrances and other heavy-traffic walkway surfaces. With Mason Treads, whether you install the Abrasive Metal, the Ribbed Type in brass or aluminum, or the Universal Type, your SAFETY problem will be satisfactorily solved. All types can be quickly and economically installed by your own workmen.



At Right and Below:  
SELF-SUSTAINING TREADS  
Used with Steel Risers

When you specify *Mason* products, you are assured of receiving *individualized attention* to your particular problem, *intelligent engineering service*, and a *quality product* at a *fair price*.



### SPECIFICATIONS—SAFETY TREADS

**New Steel Construction**—All stair treads and platforms as shown on plans shall be Mason Abrasive Iron Style VR (or other style as selected) with cross-hatched (plain or fluted if preferred) surface as manufactured by the American Mason Safety Tread Company, Lowell, Mass. Suitable steel supports and stringers with carrier angles shall be provided for securely bolting treads and platforms in place. Sheet steel riser plates (state gauge) shall be bolted to nosings and riser lips of the Safety Tread. Thickness of treads and platforms shall conform to the manufacturer's established standards.

**New Concrete or Pan-Filled Construction**—All stair treads including floor and landing-level steps shall be provided with Mason Abrasive Iron Safety Treads Style M (or H or G) cross-hatched surface as manufactured by the American Mason Safety Tread Company, Lowell, Mass. (Mason Universal Type 11, Style B Safety Tread, steel with lead inserts, may be substituted.) Safety Treads shall be 3" wide (minimum) and extend from stringer to stringer (for reinforced concrete construction, safety treads may extend to within 3 inches of stringers). Standard concrete anchors, spaced according to manufacturer's recommended practice, shall be used to secure safety treads in place.

### TYPICAL MASON INSTALLATIONS

HARVARD UNIVERSITY  
Cambridge, Mass.  
MONTREAL WEST HIGH SCHOOL  
Montreal, Quebec  
BROWN UNIVERSITY  
Providence, R. I.  
PROVINCIAL NORMAL SCHOOL  
Frederickton, N. B.  
CULVER MILITARY ACADEMY  
Culver, Ind.  
UNIVERSITY OF MINNESOTA  
Minneapolis, Minn.  
U. S. MILITARY ACADEMY  
West Point, N. Y.  
U. S. NAVAL ACADEMY  
Annapolis, Md.  
UNIVERSITY OF FLORIDA  
Gainesville, Fla.  
PRINCETON UNIVERSITY  
Princeton, N. J.  
LOUISIANA STATE UNIVERSITY  
Baton Rouge, La.  
WILLIAMS COLLEGE  
Williamstown, Mass.  
AND HUNDREDS OF OTHERS

**Write for copy of the MASON catalog—sent free on request to any school official or architect.**

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# KREOLITE FLOORS



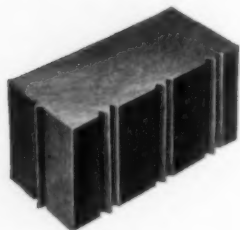
**Quick to Install**

**Easy to Replace**

THE JENNISON-WRIGHT CORPORATION • TOLEDO 1, OHIO

## Kreolite Kountersunk Lug Blocks and Kreolite Grooved Blocks

- For use under varying conditions of service with a type designed to provide the best block for each service condition encountered.



**Kountersunk Lug Type**

The Kountersunk Lug Type, available in Yellow Pine and Upland Oak end grain blocks.



**Grooved Block Type**

The Grooved Block Type also available in Yellow Pine and Upland Oak end Grain Blocks.

The grooved type is especially suitable for use under dry interior conditions, while the Kountersunk Lug type is primarily designed for all general conditions, wet, damp or dry, for both inside and outside service.

Either type of block is available in End Grain Yellow Pine (Class I), or End Grain Upland Oak (Class II), the Upland Oak being recommended for use where extremely heavy traffic is encountered or in aiseways and floors subject to abnormal use.

Class I and II blocks are impregnated under pressure with Kreolite Creosote oil.

The usual depth of the blocks varies from 2", 2½" and 3", but varies with the intensity of the traffic and should be determined by an experienced engineer.

### SPECIFICATIONS • For K50, Class I and Class II Kountersunk Lug or Grooved Blocks

#### MANUFACTURE:

The blocks shall be the Kreolite Kountersunk Lug Type with two or three lugs on one side and one lug on one end of each block. The lugs shall protrude approximately ⅜" from the side of each block. These lugs shall be an integral part of the wood, extending in the direction of the grain. Lugs shall protrude ⅜" for interior dry conditions, ½" for interior wet conditions, ⅞" for exterior platforms, driveways, etc.

They shall be 2", 2½" or 3" in depth, approximately 2¾" to 4" in width, and may vary from 4" to 8½" in length. A variation of ⅛" shall be allowable in depth and ⅛" in width of blocks furnished.

They shall be manufactured from carefully selected Southern Yellow Pine and shall be treated with Kreolite Creosote Oil, in accordance with the modern Kreolite Pressure Process, leaving at least 6 lb. of oil per cubic foot of timber in the blocks.

Season checks shall not be considered defects.

They shall be manufactured by The Jennison-Wright Corporation and laid according to the following specifications, under the direction of the manufacturer's superintendent.

#### INSTALLATION:

The blocks shall be installed on a seasoned concrete base, which has been finished smooth and level (a smooth wood float finish will be satisfactory) exactly the depth below the finished floor level corresponding with the depth of the block used. Care must be taken to see that there are no projections, ridges or waves in the concrete that will form an uneven bearing for the blocks.

The concrete base shall be thoroughly cleaned of dust and dirt and given a prime coat of Kreolite Priming Oil. After the priming oil has dried, it shall be given a thin, even coating of hot

Kreolite Pitch, not exceeding ⅛" in thickness. This coating shall be allowed to harden before laying the blocks.

Upon the base, as above prepared, the blocks shall be laid tightly together with the grain vertical. The courses of the blocks shall be kept straight and parallel and all joints shall be broken by a lap of at least one inch. In truckways and whenever possible, the blocks shall be laid with their length at right angles with the line of traffic.

**Expansion Joints.** Against the walls on all sides of the floor, as well as around all columns and other obstructions, a Kreolite Bituminous Expansion Joint one inch in width shall be used.

**Filler.** After the blocks have been laid in place and brought to a true and level surface, the surface of the blocks shall be flushed over carefully with Kreolite Pitch Filler, applied just below the boiling point, with a carefully manipulated squeegee machine. Care must be taken in its application to leave a clean surface.

After a period of at least two (2) hours, to allow the Kreolite Pitch Filler to cool and settle, a second application of filler, consisting of Kreolite Jennite, shall be flushed over the surface, without heating, and the surplus removed from the surface at time of application with a rubber edged hand squeegee. A period of at least eight hours shall be allowed for the Jennite to dry, after which the floor is ready for use. At completion, joints shall be filled uniformly to within approximately ¼" of surface.

**NOTE:** We do not recommend transverse expansion joints in the concrete base. If such joints are used the expansion joints must be left far enough below the surface of the concrete, so that when expansion of the concrete occurs, the expansion joint material will not be forced above the surface, and raise the blocks above the finished floor level.



The Pratt & Whitney Div., of Niles-Bement-Pond Co., West Hartford, Conn., over 887,000 sq. ft. of Kreolite Kountersunk Lug Wood Block Floors laid with Kreolite Pitch and Kreolite Jennite Filler. Architect—Albert Kahn, Detroit, Mich., Builder—Jas. Stewart & Co., Inc., New York.

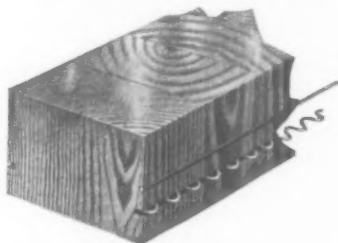


The Kaiser-Frazer Corp., Willow Run, Mich. Over 2,500,000 sq. ft. of Kreolite Kountersunk Lug Wood Block Floors with Kreolite Pitch and Kreolite Jennite Filler have been laid. Original building designed for Ford Bombers by Albert Kahn, Detroit, Mich.—Built by Bryant & Detwiler, Detroit, Mich.



## Kreolite Flexible Strip End Grain Wood Block Floors, Class III

- For use in industrial plants, in the printing industry, etc., and in gymnasiums, schools, drill halls, etc.



**Flexible Strip  
End Grain Block**  
Showing the steel wire truss  
used to hold blocks to-  
gether.

Designed to meet the demand for a light, natural color end grain wood block floor, and featuring a galvanized steel wire truss embedded in the side surfaces of the strips, forming a continuous type of flooring much more suitable than the loose block type for certain uses.

Impregnated with a colorless and odorless preservative that does not stain the wood, or with waterproof Kreolite Oil, if desired.

### SPECIFICATIONS • For K-50, Class III Flexible Strip End Grain Blocks

#### MANUFACTURE:

Kreolite End Grain *Flexible Strip* Wood Block Flooring shall be manufactured from kiln dried Southern Yellow Pine not over 2" x 4" in cross section, and assembled in *flexible* strips two feet to eight feet in length, inches in depth parallel to the grain of the wood and approximately 3 1/2" in width.

Flexibility is essential in order to permit the strips to readily conform to the contour and deflections of the subbase. After manufacture, the strips shall be flexible enough to conform to the arc of a 17 foot diameter circle without injury to the blocks, or to the bonding trusses.

The strips shall show end grain only, on both the top and bottom surfaces.

The individual blocks shall be bonded into strips by galvanized steel wire trusses tightly embedded within their side surfaces at right angle to the grain, and milled for tight fitting, galvanized crimped steel wire splines.

The assembled strips shall be dressed square and true, to accurate, uniform dimensions on the wearing surface and two sides.

The assembled strips shall be impregnated at the plant with Kreolite moisture repellent Transparent Preservative to protect the material against absorption of moisture.

#### WATERPROOFING:

Where the strip flooring is to be installed on the ground floor or in basement, where water or moisture may seep through the concrete floor slabs, an approved waterproofing membrane shall be provided between the concrete slab and the blocks. The walls extending below the ground shall be properly waterproofed at time of construction by the building contractor.

#### INSTALLATION:

The interior of the building shall be dry and, if weather is cold, shall be heated before the flooring is installed.

The flooring shall be stored as long as possible in well ventilated piles in the building under actual conditions of heat and humidity, prior to installing.

The concrete base shall be solid, smooth, dry and clean and brought to a plane parallel to, and the exact depth of the Kreolite Strip Blocks, below the level of the finished floor.

After sweeping, the base shall be given a prime coat of Kreolite Priming Oil, followed, when dry, by a smooth, uniform coating of hot Kreolite Bituminous Cement, applied at approximately 275° F.

When this coating has cooled, the Kreolite End Grain Flexible Strip Block Flooring shall be laid with each strip interlocked to the adjoining strip by tight fitting, galvanized crimped steel wire splines, which overlap at least six inches across end joints.

Expansion joints one inch in width shall be formed around all columns and against all walls. These spaces shall be filled with Kreolite Expansion Joints.

The instructions of the manufacturer shall be followed when installing Kreolite Strip Block Flooring.

Conditions of temperature and humidity in the room must be proper for the application of the Finish.

#### FINISHING—For Industrial Use

After laying, the Kreolite Strip Flooring shall be sanded once over with an electric sanding machine and given two coats of Kreolite Penetrating Seal, applied 24 hours apart.

#### FINISHING—For Schools, Auditoriums, Gymnasiums, Etc.

The surface of the floor, after installation, shall be sanded smooth with an electric sanding machine. Kreolite Paste Filler shall then be carefully squeegeed over the surface and rubbed in, until all joints are completely filled; surplus filler shall be removed.

After at least twelve hours there shall be applied two coats of Kreolite Gymnasium Varnish, applied 24 hours apart. The floor shall be buffed between coats with steel wool and polished or buffed after the final coat with an electric polishing machine.

Conditions of temperature and humidity in the room must be proper for the application of the finish. The finish shall not be applied until all other sub-contractors have left the room, and in no case under adverse weather conditions.

Additional finish coats of Kreolite Gymnasium Varnish may be applied, as wanted, at an additional cost.

The finished Kreolite End Grain Flexible Strip Block Floor shall then be protected from dirt and damage by covering with tarpaulins, sawdust or building paper until the building is ready to turn over to the Owner.

#### MAINTENANCE:

Kreolite Strip Block Floors should be cleaned and polished periodically, at least once every thirty days, with Kreolite Floor Cleaning & Preserving Compound, a Non-slip Bees-wax product, applied with a lamb's wool applicator and polished with an electric polishing machine equipped with a bassine brush.



The Olney School, Ross Township, Ohio. Kreolite Flexible Strip Block Floors were laid in the Auditorium, Stage, Lecture and Demonstration Rooms, Laboratories and Carpenter Shops.—Howard Manor, Grand Rapids, Ohio, Architect. James I. Barnes Construction Co., Dayton, Ohio, Contractor.



Kreolite End Grain Strip Wood Block Flooring in Composing Room, Chicago Tribune Tower Building, Chicago, Illinois, showing area between linotype machines. Over 75,000 square feet in this installation which includes mailing and file rooms, monotype and matrix sections, and shop areas.

## Kreolite Jennite

### • For Adding Life and Appearance to Old Block Floors

Kreolite Jennite is recommended for use as a final filler and finishing coating for all Kreolite Class I and Class II wood block flooring construction. It is also recommended for use in the rejuvenation of old wood block floors, improving their service and appearance, as well as prolonging their life.

A coal tar product, Kreolite Jennite is an irreversible colloid with heavy closed ring hydrocarbon base, with water as the continuous phase. It is not affected by petroleum lubricants or other petroleum products. It is a coal tar pitch emulsion, which does not soften or become tacky under high temperatures.

## Other Kreolite Products

- Creosoted Timbers, Cross Ties, Piling
- Coal Tar Pitch • Coal Tar Products • Creosote Oil

## Kreolite Services Include

**CHEMICAL DIVISION** . . . For laboratory determination, and for development of improvements in timber treatment, treating processes and Kreolite products.

**ENGINEERING DIVISION** . . . For consultation and design of materials using products made or supplied by the Jennison-Wright Corporation.

**SERVICE DIVISION** . . . For installation of Kreolite Wood Block Floors on contract basis, or supervision of installation.

**RESEARCH DIVISION** . . . For periodical inspection of installations of Kreolite Wood Block Floors and other Kreolite products.



Main Aisle—Stickney Ave. Plant, Electric Auto-Lite Co., Toledo, Ohio. Rejuvenated with Kreolite Jennite Mastic Filler.

## Specify KREOLITE . . . Accept No Substitute HOW WOOD BLOCKS SPEED PRODUCTION

- 1 Quick to Install—Use Immediately After Laying
- 2 Easy to Replace in Sections—or by Units
- 3 Low Maintenance Cost\*
- 4 Low Tractive Resistance—Easy to Truck Over
- 5 Comfortable to Work Over
- 6 Dustless—Protect Bearings and Finished Product
- 7 Absorb Noise—Quiet
- 8 Lessen Vibration—Composed of Many Units
- 9 Resilient—Protect Drapped Tools and Parts
- 10 Insulate Against Heat and Cold
- 11 Spark-proof—Skid-proof—Safe\*\*
- 12 Firm Foundation for Machines
- 13 Durable—Withstand Heavy Abuse
- 14 Easy to Provide for Conduits or Cables
- 15 No Glare from Reflected Light—No Eye Strain Causing Increased Fatigue and Poor Work

\* Total repair costs over 20-year period under heavy duty have been reported as low as 1/2 of 1% of original investment.

\*\* Kreolite Wood Block Floor is cleaner and safer (because skid-proof) when given a final coating of Kreolite Jennite, our new exclusive final filler and finish.

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<b>NEW YORK, Buffalo 2</b> A. H. Weaver Lumber Co., 803 Erie County Bank Bldg.	Cleveland 1031	<b>VIRGINIA, Richmond 3</b> W. Morton Northen, 2 North 6th St.	2-6507

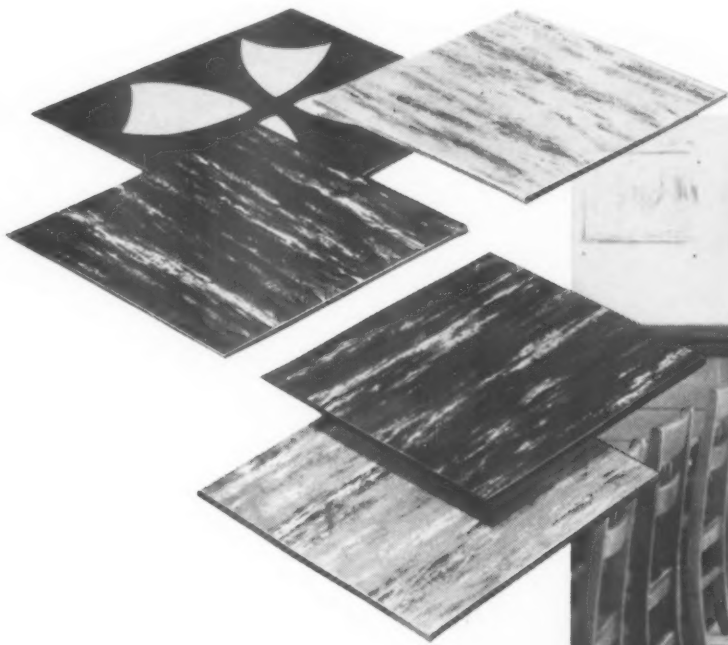
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**THE JENNISON-WRIGHT CORP. • 2463 BROADWAY, TOLEDO 1, O.**

# LOW-COST LONG-WEARING KENTILE FLOORS

are ideal for any school

*Asphalt Tile Selected by Architects and Builders  
in Preference to Any Other School Floor \**

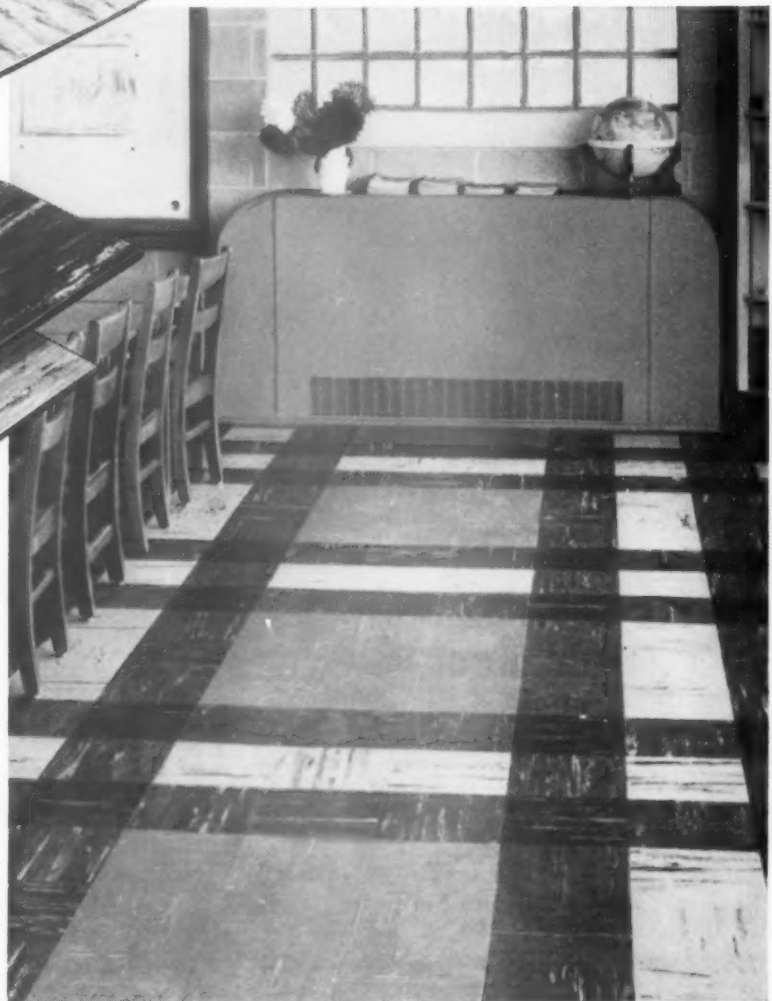


## KENTILE®

*The Asphalt Tile of  
Enduring Beauty*



*\* from results of survey  
made by leading publication*





# KENTILE offers decorative and practical unmatched by any other

**LOW COST.** Kentile costs surprisingly little to buy and install. Laid tile-by-tile, it goes down quickly and easily. No expensive sub-base is needed—Kentile is installed on any smooth, clean, firm underfloor.

**DURABLE.** The service record of Kentile Floors in use more than twenty years proves the long-wearing qualities of this tough material. The hardest usage leaves no scuff marks on Kentile. Colors can't wear off—they go right through each tile.

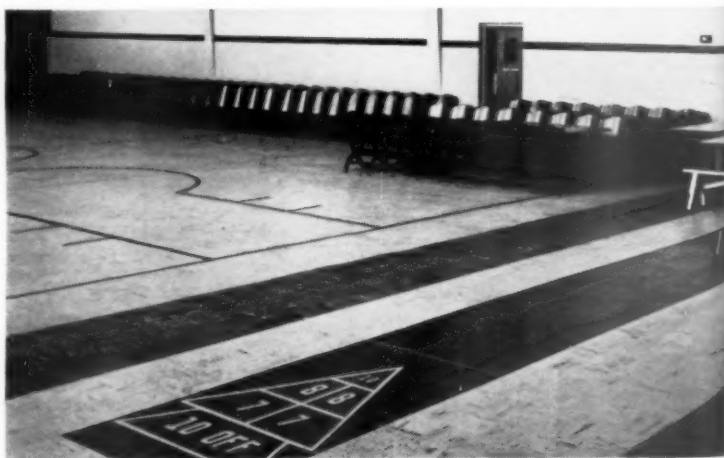
**EASY TO CLEAN.** Kentile's smooth surface sheds dirt—keeps its clean, attractive appearance with little attention. Mild soap and water is all the washing it requires. A rich, like-new gleam is attained by occasional no-rub waxings.

**BEAUTIFUL.** Plain and marbled colors (25 in all) allow for practically any design effect—thanks to tile-by-tile installation. The illustrations indicate Kentile's suitability in different school interiors.

**SAFETY.** The pupil's own parents couldn't ask for a safer floor than Kentile. Virtually fire-resistant, it meets every requirement of fire underwriting tests. Besides, its non-slip properties offer an additional safety factor. After testing various floors, the U. S. Bureau of Standards states: *Under most conditions, asphalt tile is safer to walk on than any other smooth-surface material (provided it has no high gloss finish).*

**RESILIENT, QUIET.** Classrooms and corridors are spared annoying footstep clatter when resilient Kentile goes down. Pupils and teachers find their efficiency heightened with these quieter floors.

**SPECIAL KENTILE** is greaseproof...perfect for school workshops, kitchens and cafeterias...for areas subject to grease, oil or fats. It offers all the advantages of Standard Kentile plus being greaseproof.



An idea for recreation areas—permanent game markers inserted in the floor. School emblems, etc., can just as readily be cut to order in Kentile and made a permanent part of the floor.

# practical advantages any other low-cost floor



**EXCLUSIVE THEMETILE**  
and **KENSERTS** come ready-made  
...cost nothing extra to install

For younger pupils' classrooms and playrooms ThemeTile and Kenserts are deservedly popular. These gay, colorful designs come pre-assembled so they are set into the floor as easily as any other tile. ThemeTile (9" x 9") include these designs: Pitcher, Sprinkler, Spoon and Fork, Kettle, Frog, Bird, Ivy, Daisy, Bunny, Stork, Fish, Weathercock, Duckling, Caduceus, Dot, Petal, Musical Notes in various color combinations. Larger, colorful Kenserts (18" x 18") come in the following attractive designs: Compass, 4 Aces, Sail Fish, Mortar and Pestle, Sun Flower, Chef, Vegetables, Top Hat, Clown, and G-Clef.

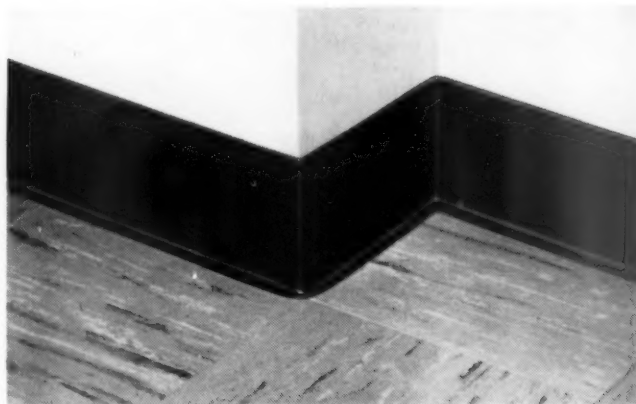


## Ideal for School Walls, too

Fingerprints or pencil marks are easily removed from walls covered with easy-to-clean Kentile. Quickly installed over all smooth wall surfaces, it ends the need for periodic painting and refinishing — saves money year after year. It is well suited for wainscoting in halls and corridors — or wherever soiling and smudging is a problem. Available in colors which will harmonize or contrast with Kentile Floors.

## SANITARY KENBASE ELIMINATES DIRT-CATCHING CORNERS

This Kenbase, applied where walls meet floor, seals the joint—so there are no crevices to harbor dust or dirt. Speeds cleaning jobs. Can be applied directly against any smooth wall—available in Black, Quarry Red, Green, Tan, Grand Antique and Sarrancolin. Kenbase is as durable and wear-resistant as Kentile—will not show scuff marks when mops or brooms hit against it. It is the perfect finishing touch—especially desirable in school installations.



## KENTILE'S WIDE RANGE OF SIZES MEETS EVERY INSTALLATION NEED

Kentile is made in 9" x 9" squares. Also in special sizes—3" x 3", 3" x 6", 4" x 4", 4½" x 4½", 4½" x 9" and diagonal tiles of all sizes to suit any

flooring area—large or small. Standard Kentile is 1/8 inch thick with 3/16 inch also available—the latter for heavy traffic areas.

## For Impressive Beauty and Quiet Dignity...KENCORK FLOORS and WALLS

The distinctive appearance of Kencork gives just the right decorative touch to libraries and other school interiors where "something special" is desired. Yet Kencork Floors and Walls more than meet every practical requirement. It muffles sounds, cleans easily, takes on added beauty with the years. It is made to resist the toughest wear and tear—being manufactured of cork flakes which are compressed under great pressure into a dense slab. Available in 3/16", 5/16", 1/2" thicknesses.



**DAVID E. KENNEDY, INC.**, 58 Second Ave., Brooklyn 15, N. Y. • 350 Fifth Ave., New York 1, N. Y. • 705 Architects Bldg., 17th and Sansom St., Philadelphia 3, Pa. • 1211 NBC Bldg., Cleveland 14, Ohio • 225 Moore St., S.E., Atlanta 2, Ga. • Kansas City Merchandise Mart Inc., 2201-5 Grand Ave., Kansas City 8, Mo. • 1440 11th St., Denver 4, Colo. • 4532 South Kolin Ave., Chicago 32, Ill. • 1113 Vine St., Houston 1, Texas • 4501 Santa Fe Ave., Los Angeles 58, Calif. • 95 Market St., Oakland, Calif. • 452 Statler Bldg., Boston 16, Mass.



## MAPLE FLOORING MANUFACTURERS ASSOCIATION



46 Washington Boulevard  
Oshkosh, Wisconsin

## HARD MAPLE

The thorough-going excellence of Northern Hard Maple flooring for school building areas has been demonstrated through generations of such service.

The letters, MFMA, impressed into the under side of Northern Hard Maple flooring, provide a reliable index of species (genuine *Acer Saccharum*) and of strict adherence to the rigid grading and dimensional standards of the Maple Flooring Manufacturers Association, founded in 1897, oldest of all flooring associations.

### **The Time-Proved Favorite Floor for Schools**

In thousands of schools from kindergartens to colleges, Northern Hard Maple flooring has proved its ability to fight the scuffs and scars of hundreds of millions of heedless footsteps . . . and stay bright, smooth, cheerful, resilient, with minimum maintenance. It lends itself admirably to the most modern styling, while harmonizing perfectly with traditional design.

### **Northern Hard Maple Floors Are Permanent**

The tough-fibred, close-grained structure of this magnificent wood gives it the resiliency to resist pointed impacts encountered in such hard-service areas as school shops, cafeterias and kitchens. Unlike coarser-grained woods, it has no tendency to splinter or dent, even under violent impacts, or to roughen unduly under abrasion.

### **They Are Economical and Easy to Maintain**

Brush-cleaning keeps Maple clean easily. Refinishing is simple—"there's always a new floor underneath." The almost universal use of Northern Hard Maple for gymnasium and ballroom floors, for roller skating rinks and bowling alleys, accurately indicates its endurance. And a point of prime importance is the notable savings practical with MFMA Second Grade, Second-or-Better Grade, or Third Grade, in many school floor areas. The grading classifications have no bearing on the soundness, durability or strength of the material.

*See,  
Sweet's*

Architectural File 13g-7 and Engineering 4j-21 contain full dimensional data, grading rules and standard specification material. Write the Association Offices for newest MFMA folders on approved finishes, etc.



Kindergarten classroom of Everett Elementary School, Detroit, floored throughout in Northern Hard Maple. Photo, courtesy Griffels & Vallet, Inc., L. Rossetti, Assoc. Engineers and Architects.



Northern Hard Maple floor of dual-purpose gymnasium and roller-skating rink, Archbishop Stepinac High School, White Plains, N. Y., Eggers & Higgins, Architects, New York, N. Y.

Music room floored in Northern Hard Maple, in the Winnetko, Illinois, New Trier Township High School.



# THOS. MOULDING FLOOR MFG. CO.

EXECUTIVE OFFICES

165 West Wacker Drive, Chicago 1, Ill.

DISTRICT SALES REPRESENTATIVES IN ALL PRINCIPAL CITIES

THOS. MOULDING

## Moultile

Flexible Reinforced  
MASTER ASPHALT TILE

Moultile Master Asphalt Tile combines all the qualities desirable for school floors. It is highly decorative. The sparkling, fresh colors have clarity and depth of tone, and the subtly interwoven veining creates a pleasantly variegated appearance.

Moultile is quiet underfoot, and has a pleasant resilience and elasticity. It is low in original cost, and exceptionally low in maintenance cost.

Durability is an outstanding characteristic of Moultile Asphalt Tile. Millions of scuffing, scraping feet will cause no perceptible wear . . . will not affect color and texture which are uniform throughout. Moultile, therefore, requires no expensive periodic refinishing.

Moultile is ideal for classrooms, corridors, and lobbies. In gymnasiums it yields a secure footing which does not tire contestants or cause floor burns and may quickly be waxed for dancing.

### Reinforced for Extra Strength

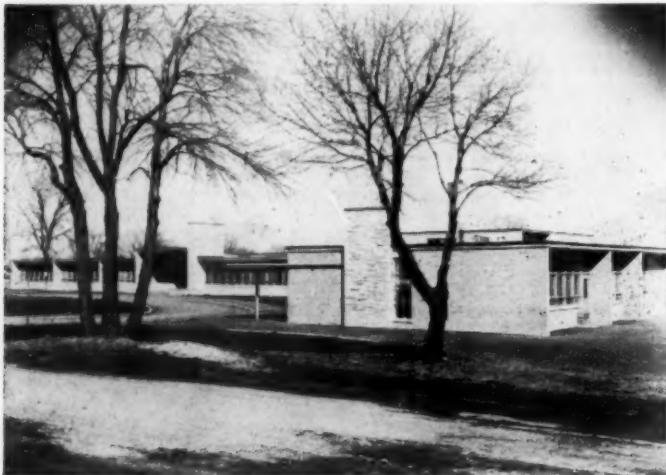
A new type of reinforcing material now combines exceptional strength with even greater flexibility. MOULTILE immediately accommodates itself to minor subfloor irregularities, permitting immediate use after installation. MOULTILE is truly inert and remains permanently bonded to the sub-floor.

### Ideal for Basement Floors

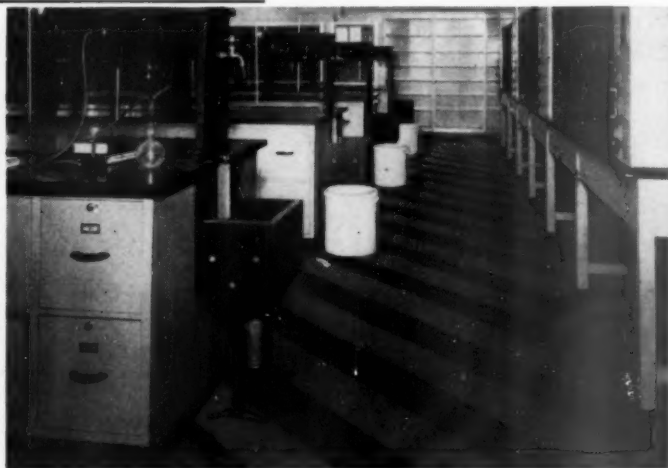
Moultile and the asphalt cement in which it is laid are impervious to the alkali and dampness always present in cement resting on the ground, which destroy other types of flooring. Moultile bonds permanently, does not buckle or loosen and will not rot or decompose. It solves the problem of flooring over cement resting on the ground.

### Many Colors and Sizes

Moultile is available in thirty-three rich colors, plain and marbled. Thicknesses:  $\frac{1}{8}$  or  $\frac{3}{16}$  inch. Sizes: 9 x 9, 12 x 12, and 18 x 24 inches.



The Palatine, Ill., School is an excellent example of the new trend in school design. Here again, as in new school construction elsewhere, MOULTILE, plus Thos. Moulding Flexible Base, was the logical choice for its clean beauty, long-wearing qualities, low cost, easy maintenance. PERKINS & WILL, CHARLES KLOPP, Associated Architects



Thos. Moulding's wide range of flooring materials satisfied a variety of specific needs in the Science Bldg., St. Thomas College, St. Paul. Moultile was installed in classrooms, Chemproof Tile in some of the laboratories (above) and Acid-Resistant Tile in others. ELLERBEE & CO., Architects

THOS. MOULDING

## Chemproof

TILE

This new plastic tile extends the use of resilient floorings, with all their beauty, comfort and economy, to areas where they have heretofore been impractical, due to the effects of chemical spillage or severe cleaning.

Chemproof Tile withstands the destructive action of virtually all chemicals. At the same time Chemproof establishes new standards of colorful beauty, flexibility and comfort. Colors are deep and clear, and extend to the attractive light shades. Utmost flexibility prevents breakage and contributes to buoyant underfoot comfort.

With its all-around immunity to chemicals, Chemproof Tile is especially well-suited for areas, such as kitchens and cafeterias, subject to frequent and rigorous cleaning with strong compounds. For utmost protection . . . together with spic and span beauty, lasting durability and economical maintenance . . . choose Thos. Moulding Chemproof Tile.

THOS. MOULDING

## Greaseproof

TILE

Thos. Moulding Greaseproof Tile resists the grease and oils that discolor and soften other floor coverings. It is ideal for domestic science rooms, kitchens, cafeterias, and machine shops. This flooring has the same resilient buoyancy, the same high strength and other characteristics of Moultile.

THOS. MOULDING

## Acid-Resistant

TILE

Thos. Moulding Acid-Resistant Tile is a specially formulated Moultile for giving maximum resistance against acidic and alkaline chemicals which are harmful to other types of floor coverings. It is recommended for laboratory installation and for lavatories. It has all the other characteristics of Moultile . . . durability, underfoot comfort, etc.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

## THOS. MOULDING

**Safety Tile**

Provides positive,  
non-slip underfoot safety, even when wet.

Thos. Moulding Safety Tile is a floor tile in which non-slip chips, incorporated during the manufacturing process, positively eliminate the slip hazard, even when the floor is wet and also provide greater resistance to wear. Thos. Moulding Standard Safety Tile has all the other characteristics of Moultile and is similarly installed. It is also available in the Acid-Resistant and Greaseproof types.

Thos. Moulding Safety Tile is now widely used in front of elevators, on stair treads, under revolving doors, and in vestibules, stair entrances, ramps, etc., wherever safety is essential, and wherever exceptional durability is called for.



*In this gymnasium the resilient Moultile floor provides non-tiring buoyancy and sure footing for athletes, yet defies punishing wear. The game lines, inlaid with contrasting Moultile, never fade, never need painting. WILLIAM E. NELSON, Architect*

## THOS. MOULDING

**Underfloor**

## TREATMENTS

Virtually any old cement or wood floor, no matter how bad its condition, can be made into a suitable foundation for floor coverings through the application of Thos. Moulding Rubbercote, Quicksmoother, Asphaltcrete and Magnesite Underlayments. These materials have been specially developed by Thos. Moulding to smooth and strengthen sub-floors that are cupped, cracked, uneven or springy.

Thos. Moulding also specializes in the repair of magnesite and mastic floors.

## MAINTENANCE MATERIALS

Good floors deserve good care. The following maintenance materials, specially developed for use on Moultile, are recommended as being safe, efficient and economical for use on all floor coverings.

**Permagloss**—A bright-drying, self-polishing liquid floor wax which contains no oil, grease or other harmful solvents.

**Kleenolene**—A non-caustic liquid soap which will not injure floors or finishes.

**Sweepolene**—A sweeping compound made with wax instead of the oil found in commercial compounds.

## PRODUCTS OF

**Thos. Moulding**

Floors, Walls, Treads, Trim . . . from Plastics

## FLOORS

## Tile

Moultile  
Aristoflex  
Greaseproof  
Acid-Resistant  
Chemproof  
Non-slip Safety

## Troweled-on

Moesitone  
Asphaltcrete Underlayment  
Magnesite Underlayment  
Quick-smoother  
Rubbercrete

## WALLS and WALL BASES

Moultile Walls  
Greaseproof Walls  
Acid-Resistant Walls  
Flexible Cove Base  
Flexible Straight Base

## PLASTIC SPECIALTIES

Moulthead Stair Tread and Nosing  
Flexedging  
Shuffle Board Patterns

## MAINTENANCE MATERIALS

Permagloss Self-polishing Wax  
Sweepolene Sweeping Compound  
Kleenolene Non-caustic Soap

**INSTALLATION**—Approved flooring contractors contract to install Thos. Moulding floors anywhere in the United States and nearby countries. Write for samples and complete technical information on Moultile and the Company's other products, listed above.



*In the Hopkins School, Hopkins, Minn., the bright, clear colors of Thos. Moulding MOULTILE make for a cheerful classroom atmosphere . . . reflect a high degree of all-important light. MOULTILE's toughness will keep this floor looking trim even after years of service. HANBY, BISSEL & BELAIR, Architects. The Kerntile Co., Minneapolis, Contractors*

## THOS. MOULDING

**Flexible Base**

## ON-TOP COVE TYPE

Thos. Moulding Cove Base is a highly decorative, economical, sanitary wall trim. It is made from the same type of materials as Moultile flooring, and is therefore characterized by the same inherent durability and everlasting beauty. The Base is available in a deep, lustrous black, and also in the full range of Moultile colors. It is widely used for a sanitary juncture with every type of flooring . . . asphalt tile, linoleum, linoleum tile, rubber, cork, wood, cement or terrazzo.

This Base is made exceptionally strong. The sturdy toe and wall section withstand the kicking and bumping unavoidable in maintenance. So flexible is the Base that merely warming it on the back makes it conform readily to wavy walls and go easily around circular or square pilasters. Similarly the Base can be bent around corners, both internal and external, so neatly and easily that separate corner pieces are not needed. Due to its flexibility, the Base conforms to the slight irregularities which exist in most sub-floors. The toe need merely be warmed and pressed into continuous contact with the floor.

Thos. Moulding Base is low in original cost and low in upkeep cost. The only backing needed is a smooth plaster wall. Expensive wood grounds are not required. No initial finishing and no periodic refinishing is ever necessary.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



## H. H. ROBERTSON COMPANY

Farmers Bank Building  
Pittsburgh, Pa.

# HUBBELLITE TERRAZZO

*the functional floor surfacing*

## SOLVES FLOOR PROBLEMS

**EVERY ROOM IN A SCHOOL BUILDING CAN BENEFIT BY THE USE OF THIS MODERN FLOOR**

**RESISTANCE TO WATER** Hubbellite Terrazzo is unaffected by daily hosing down with water for quick, easy cleaning.

**ROACH REPELLENT** Roaches just will not stay on a Hubbellite floor . . . solves for all time this cafeteria and lunch room problem.

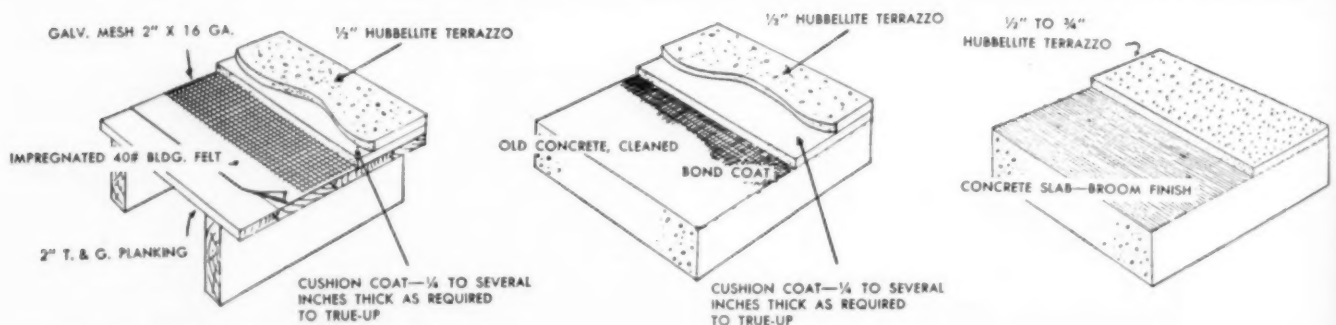
**MOLD GROWTH RESISTANCE** Inhibits the growth of many molds and bacteria, a definite contribution to sanitation in your shower and locker rooms.

**RESISTS ACTION OF COOKING FATS** Hubbellite Terrazzo will not succumb to the destructive action of cooking fats, sugars, etc. . . ideal for kitchens, cafeterias and home economics departments.

**RESISTS ACTION OF OILS AND GREASES** Hubbellite is not harmed by the solvents found in machine shops and other manual training rooms.

**RESISTS WEAR** Hubbellite Terrazzo is tough and durable . . . will not dust nor dent. Has the excellent wearing qualities that a school floor needs.

### HUBBELLITE TERRAZZO CAN MODERNIZE OLD, OFF-LEVEL FLOORS



OVER OLD OR NEW WOOD FLOORS . . . OVER OLD CONCRETE . . . OVER NEW CONCRETE



Hubbellite Terrazzo in kitchens, classrooms, halls, shower and locker rooms

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# Safe Tread products

for walkway surfaces

ABRASIVE-METAL, CERAMIC TILE,  
ANTI-SLIP AGGREGATES, ETC.

SUBMIT YOUR STAIR AND  
FLOOR PROBLEMS TO US.

WE ARE HAPPY TO  
BE HELPFUL.

## ABRASIVE-METAL SURFACE-DESIGNS

Only "Safe Tread" is made  
in FIVE different surfaces.

Plain, Hatched and Duo-Plane  
surfaces are preferable for stair  
treads, nosings, platforms, etc., where  
grooves parallel to the edge would be a  
hazard. The grooved surface is used mostly  
for door saddles of various types.

### Standard

**Plain, Hatched, Grooved** — These three surfaces,  
illustrated above, are common to all makes of abrasive  
metal and are furnished in various forms in cast iron,  
bronze, nickel and aluminum.

### Special

To meet the demand for still more durable anti-slip quality,  
and to provide certain characteristics not obtainable in the com-  
mon or Standard Surfaces of the "Safe Tread" and other makes of  
abrasive metals, two special surfaces known as "Duo-Plane" and  
"Sovac" have been developed. After service tests of several years  
under severest conditions they are recommended as the best avail-  
able materials for their respective purposes.

The Safe Tread Company, Inc.

30 VESEY STREET, NEW YORK 7, N. Y.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# "SAFE TREAD"

## ...for safe walkway surfaces

Architects, engineers and others, in their efforts to overcome the vicious slipping hazards that are one of the most common and costly sources of personal injury, have been greatly handicapped by the hitherto limited variety of suitable and dependable SAFE walkway materials.

"SAFE TREAD" Abrasive-Metals, Ceramic Floor Tile, Anti-Slip Aggregates, Etc., have been developed to provide not only dependable, enduring underfoot safety, but also an adequate range of forms and materials for selection and adaptation to almost any condition of service and architectural scheme.

*Consultations on walkway safety problems and tentative estimates on preliminary surveys may be obtained without obligation.*

THE SAFE TREAD CO., Inc.  
30 Vesey Street  
New York 7, N. Y.

### "SAFE TREAD" ABRASIVE METALS

#### The "Safe Tread" Process

"Safe Tread" Abrasive Metal is made by a *patented process* which produces anti-slip treads having a diamond-hard abrasive:

(1) Deeply embedded in and firmly held by the metal *without an intervening film of foreign material* to weaken the grip of the metal on the abrasive. (When the abrasive grains are sprayed or coated with a foreign substance to prevent washing or floating as the molten metal enters the mold, the metal cannot make intimate contact with them—a condition that clearly affects the durability of the tread.)

(2) Projecting slightly to give a safe footing under all conditions. (Unless the grains project slightly above the metal to give the necessary "bite" the surface is no more anti-slip than metal without any abrasive); and

(3) Closely distributed in the surface so that the metal is protected from wear.

#### Scope of Use

"Safe Tread" Abrasive Metals are suitable for *inside or outside*—wherever slipping is to be prevented or excessive wear withstood, in either new or repair work. It has met the most exacting requirements and has been furnished for over 6,000 outstanding projects during the past ten years; by direct purchase under the rigid inspection of the U. S. Navy; on contracts for public buildings, including postoffices, hospitals, schools, etc., and for private work including office buildings, stores, churches, dairies, packing houses, factories, railroads, subways, etc.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

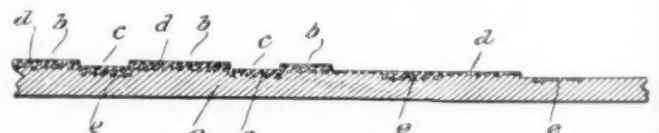
#### SIZE LIMITS OF ABRASIVE METAL CASTINGS

Length—When width exceeds 24", length must not exceed 5' 0". Under 24" width the length must not exceed 7' 0", except in 5/16" iron which must not exceed 6' 0". Max. length 3" wide "XL" 5' 0".

Thickness	Maximum Allowable Surface Width		
	Iron	Bronze	Aluminum
1/4"	Not made	Up to 6"	Up to 14"
5/16"	Up to 6"	" " 12"	" " 30"
3/8"	" " 12"	" " 18"	" " 36"
7/16"	" " 24"	" " 24"	" " 44"
1/2"	" " 32"	" " 30"	" " 48"
5/8"	" " 44"	" " 44"	" " 48"
3/4"	" " 48"	" " 48"	" " 48"

#### The New "Duo-Plane" Surface

The "Duo-Plane" Safe Tread embodies a new principle by providing an upper or initial contact plane composed of the tops of squares (b.b.) about  $\frac{3}{4}$  x  $\frac{3}{4}$  in. separated by rectangular section valley about  $\frac{1}{16}$  in. deep and  $\frac{3}{8}$  in. wide. Abrasive grains (d.d. and e.e.) are embedded at the time of casting, in *both* the squares and bottoms of the valleys to a depth of about  $\frac{3}{16}$  in. in each. When elevations are worn down, contact begins on anti-slip surfaces at bottoms of the valleys, thus providing *double life*. (In Standard Surfaces there is only one wearing plane thickness of abrasive.) This type is especially desirable for maximum durability and effectiveness.

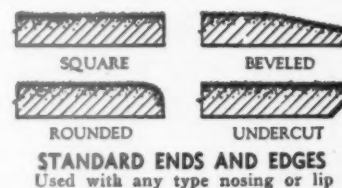
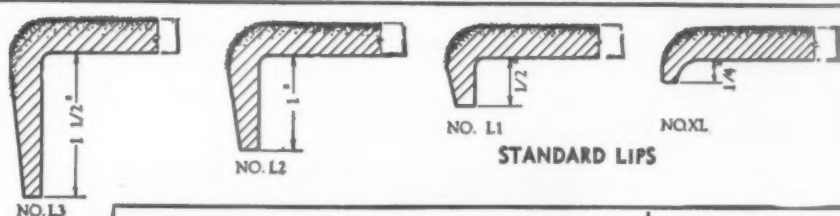
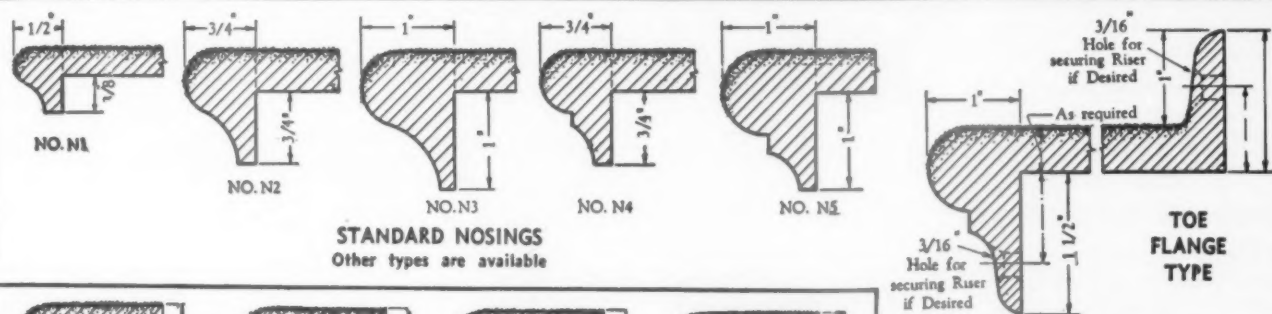
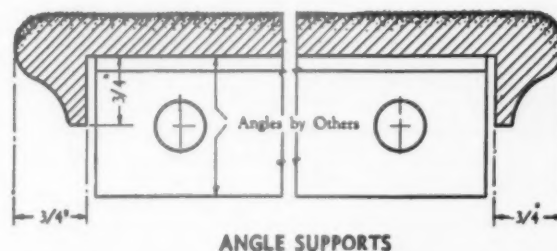
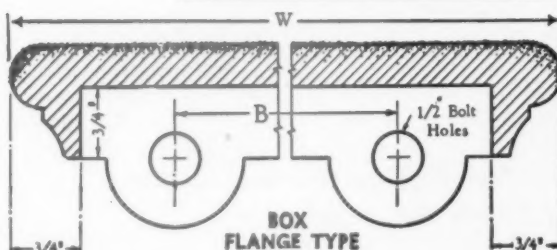
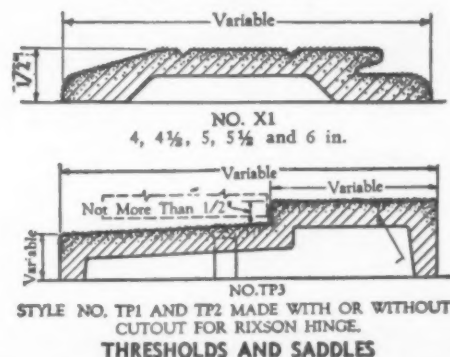
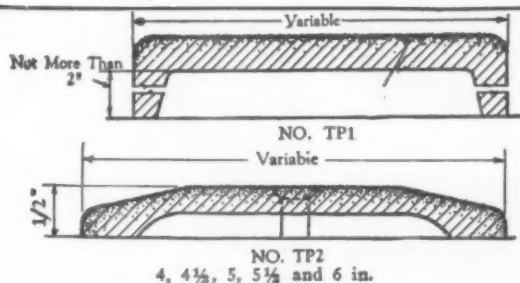
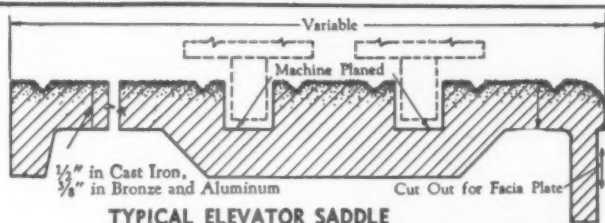
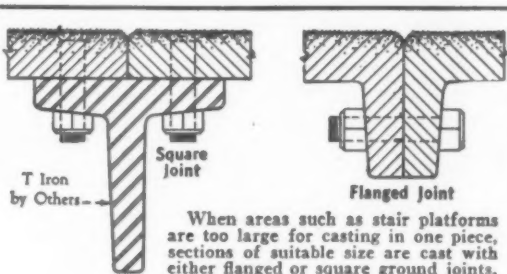


Cross Section of "Duo-Plane Safe Tread"



**"SAFE TREAD" ABRASIVE METALS (continued)****TYPICAL DETAILS OF "SAFE TREAD" FORMS**

The following details are suggestive of the many forms in which "Safe Tread" Abrasive Metals are available. They can be cast in practically any form to meet specific requirements. Minimum thickness:  $\frac{1}{8}$  in. for Iron;  $\frac{1}{4}$  in. for Bronze and Aluminum.

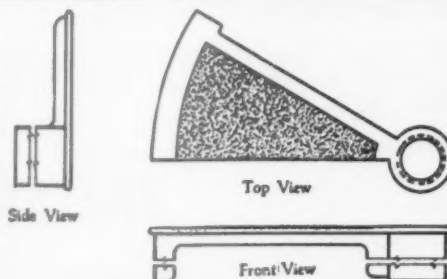
**SECTION JOINTS**

The usual supports for ends of structural stair treads are angles fabricated with the iron work. When desired, treads with end lugs or box flanges are cast as part of tread, in which case holes for  $\frac{1}{2}$ " bolts are cored on standard spacing shown below:

**STANDARD SPACING (INCHES)**

W	5	6	7	8	9	10
B	2	3	3 1/2	4	5	6

The abrasive top surface of "Safe Tread" spirals and landings makes possible the safe use of an otherwise dangerous type of stair. Made in standard sizes only, with collars for 3 1/2" pipe; 12 to 16 per circle, 18", 21" and 24" to 36" radius (in increments of 1"), with circular or square landings.



## "SAFE TREAD" ABRASIVE METALS (continued)

### IN NEW CONSTRUCTION

Iron, bronze or aluminum "SAFE TREAD" door saddles, stair treads, floor plates, etc., are made in all required forms, many of which are shown in sectional detail on preceding page.

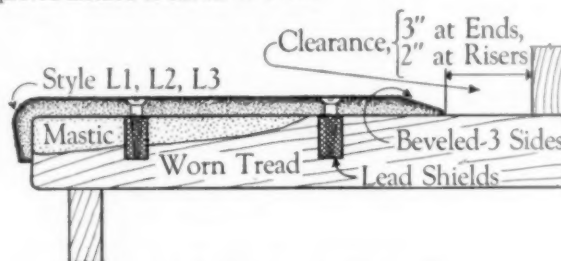
Special forms to meet unusual conditions are designed and furnished as required.

### Specifying and Ordering

When specifying Abrasive Metals, the kind of metal, *surface design*, thickness and form desired should be indicated. When ordering or requesting estimates, complete information should be furnished.

### FOR REPAIRS TO WORN STAIRS

Existing stair treads, worn or slippery, are readily and economically repaired and made safe with "SAFE TREAD". An approved method is shown in detail.



Repair to Worn Woodsteps

## OTHER "SAFE TREAD" WALKAWAY PRODUCTS.

### Anti-Slip Filler Strips

"Safe Tread" Abrasive Filler Strips provide protection against slipping and wear in places where other forms are not so well adapted for architectural and other considerations.

They are applied in grooves cut in marble, terrazzo on other stone treads, either new or old. Furnished only in strips  $\frac{1}{2}$ " x  $\frac{1}{2}$ " x 18".



"Safe Tread" Abrasive Filler Strips Applied to Terrazzo Treads

### "Safe Tread" Terrazzo and Cement Floor Finish Aggregates

For use in Terrazzo, pre-cast stone, and other composition floors where fast colors are desired and a non-porous and anti-slip element is essential for Safety and Sanitation.

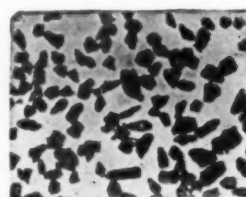
Being approximately spherical or cube-shaped, they provide maximum surface for cement adherence. They are anti-slip, *non-porous and fast colored*, stronger, harder and more durable than any crushed natural or manufactured semi-vitreous aggregate.

These aggregates are crystalline aluminum oxide, produced by electrical fusion, crushed and screened to desired size, excelled in hardness only by the diamond.

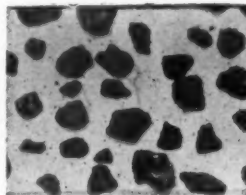
They are troweled or floated into cement finish floors to provide an effective and more durable anti-slip walking surface. Sizes 6-12, 12-20, 16.

Use  $\frac{1}{2}$  lb. per sq. ft.

Color—Dark Brown to Black.



12-30 Mesh



6-12 Mesh

Full size of  
abrasive aggregates



Floating "Safe Tread" Abrasive Aggregates into New Cement Floor

### Anti-Slip Ceramic Tile

"Safe Tread" Abrasive Floor Tile are vitrified ceramics with 15% abrasive content, *non-porous*, fast colored, and effectively anti-slip. Ask for brochure.

# THE SAFE TREAD CO., INC.

NEW YORK 7, N. Y.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# Bonny Maid. **Versa-Tile.**

(Patents Applied For)

## The All-Purpose Tile For Every Type of Floor SCHOOLS, HOSPITALS and INSTITUTIONS

Below Grade	Concrete Floors	Old or New Floors
On Grade	Steel Floors	Radiant Heated
Above Grade	Wood Floors	Floors

**Bonny Maid VERSA-TILE** is grease-proof, acid resistant and non-skid. It is a flexible floor tile that is quiet and cushiony under foot. **Bonny Maid VERSA-TILE** requires a minimum of maintenance.

### WHAT IS *Bonny Maid* **Versa-Tile**?

As the name implies, it is a versatile floor tile. Patents have been applied for **Bonny Maid VERSA-TILE**. It has not only been proven in the testing laboratories but on thousands of installations under variable climatic conditions and diversity of use.

**Bonny Maid VERSA-TILE** has performed admirably on floors BELOW GRADE . . . ON GRADE . . . ABOVE GRADE where intolerable fat, grease, lubricating oil, gasoline, etc. conditions, defied other types of floor coverings. That means **Bonny Maid VERSA-TILE** is the all-purpose tile for every type of floor . . . even in basements or in basement-less buildings with radiant heating.

The plastic binder of **Bonny Maid VERSA-TILE** consists of a group of proven compounds, chemically and scientifically treated and of high molecular weight. The broad claims for this most outstanding floor covering are due, in large part, to this plastic binder.

**Bonny Maid VERSA-TILE** is the successful product resulting from extensive technical research and years of experience in the manufacture of quality floor coverings.

The United States Testing Company, Inc. has tested and certified to our many claims for *Bonny Maid Versa-Tile*, and this world-famous laboratory has awarded *Bonny Maid Versa-Tile* its Treasured Seal of Approval. Detailed certified laboratory tests, including wear test, are listed on back page of this brochure.



### IN WHAT FORM IS *Bonny Maid* **Versa-Tile** AVAILABLE?

1/8" gauge and 3/16" gauge

A complete range of tile sizes — each tile is die-cut

A complete range of die-cut feature strips

A complete range of border sizes

\*The **Bonny Maid VERSA-TILE** line consists of 40 patterns embracing beautiful color combinations in Marbleized, Jaspés and Textures for every type of floor. No other floor covering equals it in pattern range, design or decoration.

\*Colors go right through to the backing.

### PROBLEM FLOORS ARE NO PROBLEM TO *Bonny Maid* **VERSA-TILE**



# Bonny Maid VERSA-TILE

(Patents Applied For)

— Factory Waxed —

MEETS EVERY EXACTING  
REQUIREMENT OF ARCHITECT,  
DECORATOR, BUILDER, AND  
BUILDING SUPERINTENDENT.

## Bonny Maid VERSA-TILE

- Will Not Shatter or Break
- Will Not Become Brittle with Age
- Will Withstand Tougher Indentation

... SUPERIOR RESISTANCE TO ...

Abrasion

Alkaline Moisture

Cigarette Burns

Dirt

Gasoline

Grease

Household Fats

Milk

Scratching

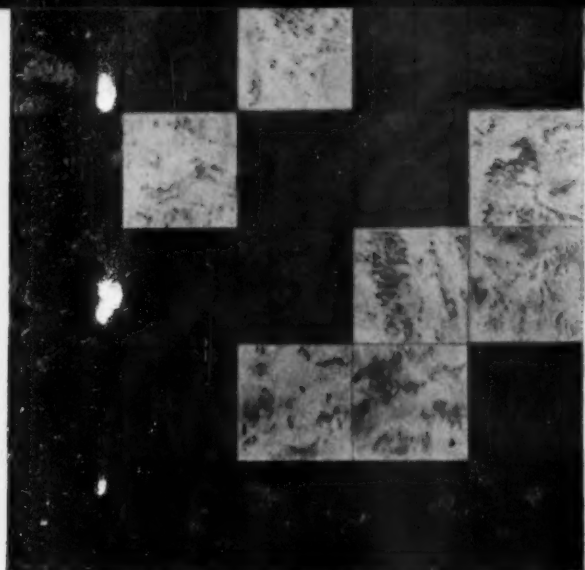
Scuffing

Soaps

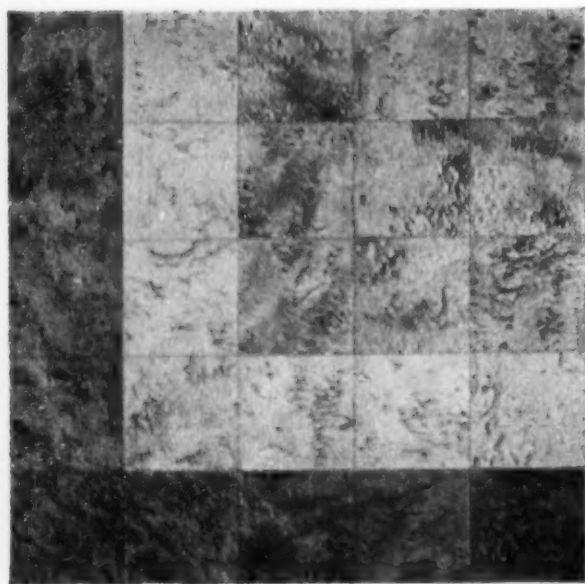
Urine



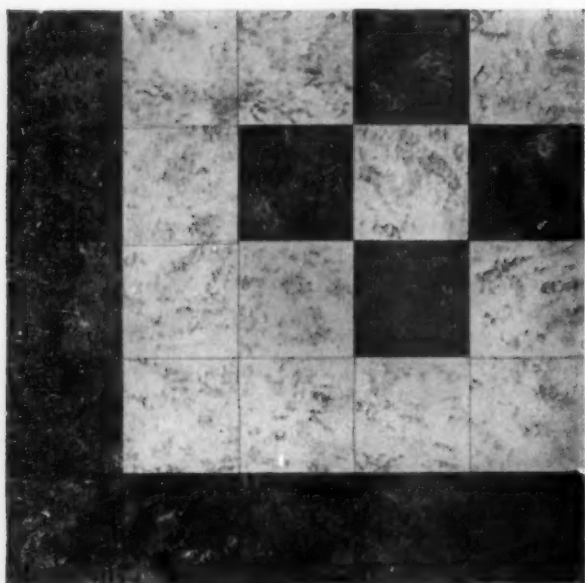
*Sanitary — Resilient — Quiet*  
*Water Proof — Vermin Proof*  
*Non-Skid*



ABOVE TREATMENT COMBINES  
PATTERN No. 3004—BLACK  
PATTERN No. 3008—WHITE  
PATTERN No. 3052—RED



ABOVE TREATMENT COMBINES  
PATTERN No. 3025—BROWN  
PATTERN No. 3007—AMBER  
PATTERN No. 3002—TAN



ABOVE TREATMENT COMBINES  
PATTERN No. 3029—GREEN  
PATTERN No. 3002—TAN  
PATTERN No. 3003—RUST

# *Bonny Maid* **VERSA-TILE**

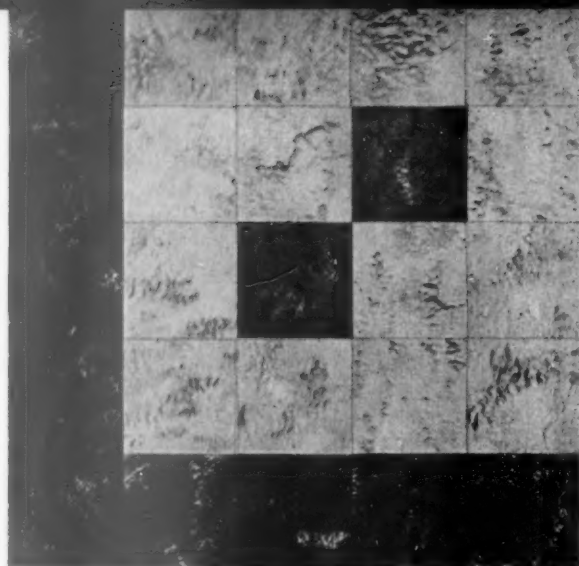
**THE ALL-PURPOSE  
FLOOR TILE**

**IDEALLY SUITED FOR**

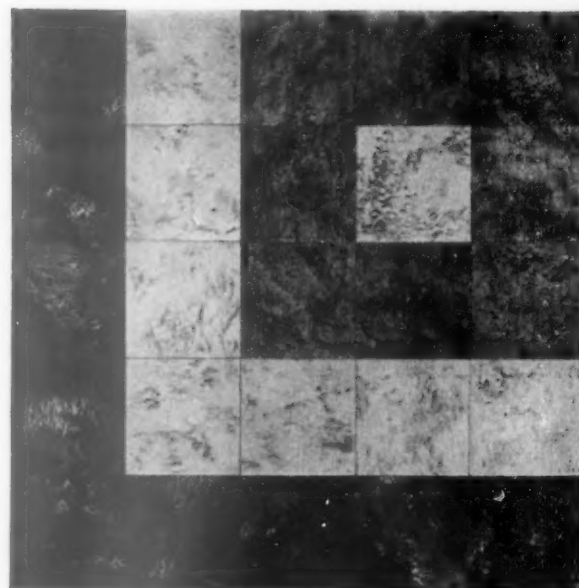
Schools	Auditoriums
Dormitories	Laboratories
Recreation Rooms	Wash Rooms
Hospitals	Stores
Infirmaries	Restaurants
Housing Projects	Restaurant Kitchens
Churches	Industrial Buildings
Hotels	Busses
Theatres	Elevators
Show Rooms	Garages
Clubs	Basements
Homes	Lobbies
Offices	

or any place where long wear with minimum  
maintenance is desired.

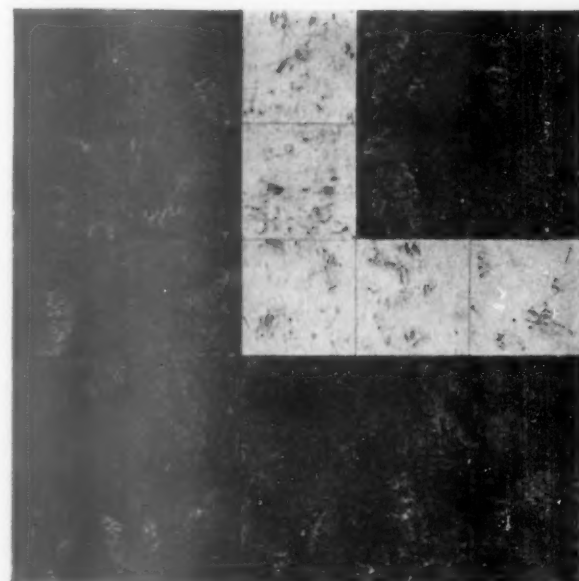
**LUXURY  
QUALITY  
AT LOW COST**



ABOVE TREATMENT COMBINES  
PATTERN No. 3004—BLACK  
PATTERN No. 3000—IVORY  
PATTERN No. 3029—GREEN



ABOVE TREATMENT COMBINES  
PATTERN No. 3003—RUST  
PATTERN No. 3007—AMBER  
PATTERN No. 3025—BROWN



ABOVE TREATMENT COMBINES  
PATTERN No. 3001—BLUE  
PATTERN No. 3008—WHITE

# Certified Laboratory Tests of

## United States Testing Company, Inc.

Report No. 19389

(copy of this report will be furnished on request)

This U. S. TESTING COMPANY, INC. REPORT No. 19389 on *Bonny Maid* **VERSA-TILE** certifies that tests were made and approved of the following:

ABRASION  
ALKALI SOLUTION (1% NaOH)  
ALCOHOL  
AMMONIA  
CLOROX (Bleaching Water)  
CIGARETTE BURNS  
CITRIC ACID (5%)  
CRAYON  
DEVELOPER (Photographer's)  
FIXER (Photographer's)  
FRUIT JUICE (Pineapple)  
FLEXIBILITY  
GASOLINE  
GREASE  
HOUSEHOLD FATS  
INDENTATION



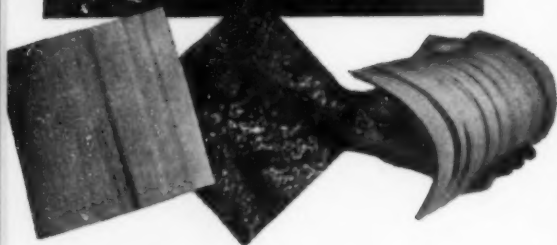
INK  
KETCHUP  
LUBRICATING OIL  
MINERAL OIL  
MUSTARD  
MERCUROCHROME  
NAIL POLISH  
OAKITE  
PEROXIDE  
SOAP SOLUTION (1%)  
SOUR MILK  
SULFURIC ACID (5%)  
TRI-SODIUM PHOSPHATE (1%)  
URINE (Synthetic)  
URINE (Natural)  
VASELINE  
VINEGAR

### ACCELERATED WEAR TEST—as reported by United States Testing Company, Inc.

"A representative area of '**VERSA-TILE**' was laid and allowed to remain for a period of 3 weeks in a location of the building through which an excessive amount of traffic of all types occurred. This traffic consisted of people, hand trucks and other modes of activity which, in our opinion, represented both light and heavy wearing conditions. At the end of the three week period, the **VERSA-TILE** was removed and cleaned with a soap solution. It was found that the sample was easily cleaned and, upon examination, there were no significant marks, scratches or indentations which would tend to mar or detract from the original appearance."

(To make sure *Bonny Maid* **VERSA-TILE** always merits its Treasured Seal of Approval, the United States Testing Company actually buys **VERSA-TILE** independently at different **VERSA-TILE** franchise dealers each month and subjects them to the most exacting tests.)

NO OTHER LOW COST  
FLEXIBLE FLOOR TILE  
CAN MAKE THIS CLAIM





# SERVICISED PRODUCTS CORPORATION

6051 West 65th St., Chicago 38, Ill.

## SERVICISED Safety Treads and Flooring

(Formerly ORCO Treads and Flooring)

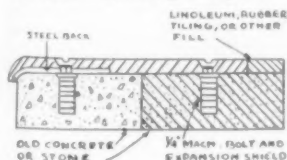


### Application of Safety Stair Treads

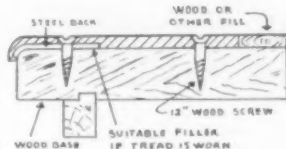
**Installation Methods**—Safety Stair Treads may be applied to wood, concrete, stone or metal construction by cementing or screw-anchoring.

**Screw Anchored**—For wood base use flat head wood screws; for concrete base use flat head machine screws imbedded in expansion anchors. Treads are easily drilled and countersunk on the job. It is also recommended that cement be applied to the sub-surface when the screw methods are used, to insure additional protection.

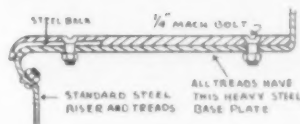
**Cementing**—Use any approved quick-setting rubber tile cement for installation of Safety Stair Treads over all types of sub-surfaces—including steel, concrete, wood, terrazzo and marble.



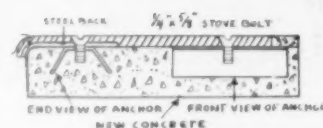
On Old Concrete



On Wood



On Steel



On New Concrete



### NEW DEEP LIP SAFETY TREAD

Servicised Safety Stair Treads and Flooring are made from a resilient tough rubber compound in which Norton Alundum aggregate has been securely embedded throughout the wearing surface.

These treads are designed to give you "Sure Safety." Safety should be the first consideration in the design of any walkway for a school building.

Stairways, ramps, landings and corridors which are subjected to the hard usage by the public and where the safety factor and public liability is of importance, the cost of Servicised Safety Treads is a mere fraction of the total cost of the building. By installing these treads you may save thousands of dollars by preventing injuries due to slipping.

The combination of resilient rubber and abrasive aggregate provides a tread surface of exceptional comfort and "sureness" under foot. The sound deadening quality of Servicised Safety Stair Treads and Flooring is recommended for use wherever the noise of foot traffic is objectionable.

Servicised Safety Stair Treads and Flooring offer you the best solution obtainable to your safety and stair noise problems. The combination of long life, maximum degree of safety and easy maintenance is not equalled by any other product.

Servicised Safety Stair Treads manufactured in five colors—Black, Red, Buff, Gray and Green, all treads and floorings are  $\frac{1}{4}$ " in thickness. The  $\frac{1}{2}$ " nosing type are available in widths ranging from  $3\frac{3}{4}$ " to  $14\frac{3}{16}$ " and in lengths up to and including 84". The Deep Lip type or  $1\frac{1}{2}$ " nosing with steel reinforced back are available only in 3" wide and lengths up to and including 84".

The Standard or  $\frac{1}{2}$ " nosing tread is recommended for use on all types of stairs. It is now manufactured with a steel reinforced nosing. It can be easily installed over wooden, concrete, terrazzo or marble stairs, by cementing it with any good waterproof cement and by the screw anchoring method.

The Deep Lip type is recommended for use where nosing have been worn on wooden, terrazzo, concrete or marble stairs. It has a steel reinforced back to give you added protection. It can be used to obtain two tone color effect on your stairs using a nosing of one color and a backup of another color of either Safety Flooring or asphalt or rubber tile. By using this two tone effect on your stair you add another safety feature to your stairs to show the public the exact location of the step edge.

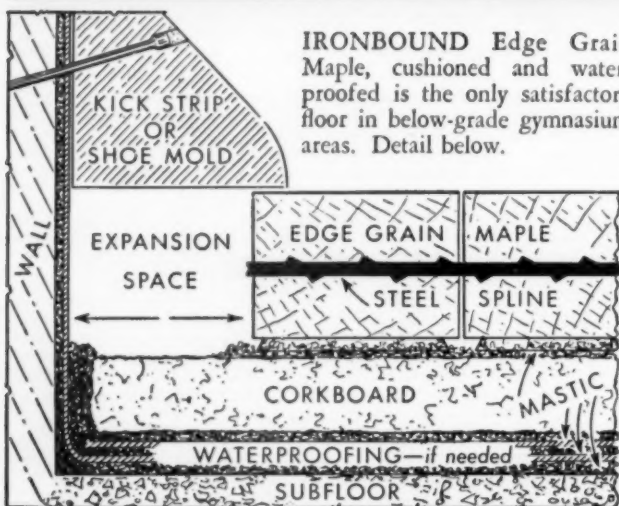
Servicised Safety Flooring is recommended for stair landings, corridors and elevator floors. It is available in the five colors and can be secured in sheets 24" x 120" or be fabricated to your specifications.

*Ironbound*  
Trade Mark

# HARDWOOD FLOORS



## EDGE GRAIN . . .



Evenly resilient throughout the floor. Interlocked.

## FLAT GRAIN . . .



25/32" IRONBOUND Continuous Strip (1st grade flat-grain maple) laid in machine shop of the Macomber Vocational H. S., Toledo. Architect: Edwin M. Gee. Installed by the Storm Flooring Co. of Mich.



IRONBOUND edge-grain maple laid over resilient corkboard in basement gymnasium of State Teachers College, Cortland, N. Y. Said President Smith: "An official voluntarily commented on his feeling of freshness after refereeing two games on this floor."



"Your IRONBOUND flooring, installed under my personal jurisdiction in the Manhasset school is in every respect most satisfactory," said William Haugaard, ex-Commissioner of Architecture for New York State in 1946.



PAR-K WOOD TILE Strips of standard T & G flooring. Factory assembled into Squares. Thicknesses: 25/32"; 33/32". Sizes: 6 1/4"; 7 1/2"; 8"; 9"; 10". Species: Maple; Birch; Beech; Oak.

Inquiries "East of Pittsburgh" address to  
**STORM FLOORING CO., INC.**  
 2500 Park Avenue, New York 51, N. Y.

Inquiries "West of Pittsburgh" address to  
**ROBBINS FLOORING COMPANY**  
 Reed City, Michigan

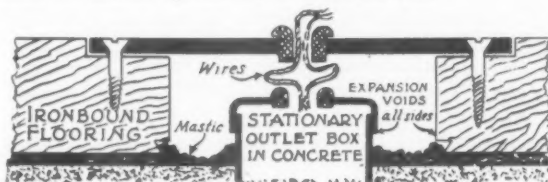
## Specifications

1. **Concrete Slab**—(Under Masonry Specifications) Concrete slab to receive wood flooring shall be furnished to Wood Flooring Contractor, smooth and straight, with no expansion joints except at walls. Where expansion voids are required other than at walls, they shall be kept at least 1/2" below floor level.

2. **Waterproofing**—All slabs on grade shall be covered with one thickness of membrane waterproofing consisting of 15# asphalt saturated felt set in Ironbound or equal mastic, edges of felt to be lapped. All areas below grade must be covered with two layers, edges of felt to be butted. Break joints of courses. Slabs above well-ventilated basements or on upper floors do not require membrane.

3. **Mastic**—CONTINUOUS STRIP Floors shall be set in a full bed of Ironbound fibrated mastic, spread by means of notched trowels to a uniform depth of approximately 1/16".

PAR-K WOOD TILE UNIT BLOCK shall be set in either IRONBOUND Fibrated Mastic as above or Everbond X mastic spread on floor while hot.

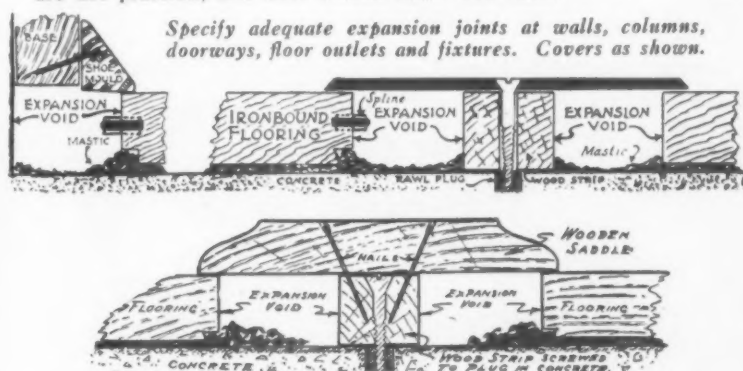


Cover Plate—Moves with Floor



Typical Detail through 25/32" Ironbound Floor

4. **Expansion Voids**—Allow at least 1/32" to the foot expansion voids on all sides of rooms, and at thresholds, columns and permanent fixtures. Cover voids with wood or metal shoe molds, saddles, metal floor plates or special outlet boxes for geyed equipment. Insert yellow cork or other compressible material in exposed voids where mouldings are not practical, and sand smooth flush with floor.



5. **Laying**—CONTINUOUS STRIP pattern shall be laid in courses and each course shall be interlocked with 3/32" x 1/2" Ironbound sawtoothed steel splines in long lengths, driven into end grooves. Break joints in each succeeding course.

PAR-K WOOD TILE UNIT BLOCK shall be laid to form alternating squares. Follow instructions in manufacturer's laying manual.

6. **Flooring**—A. GYMNASIUMS—Lay Ironbound Continuous Strip Hard Maple (state type, grade and thickness desired).

Edge-Grain in 33/32" or 1 1/4" thickness is recommended for below grade areas. 33/32" Flat-Grain is recommended for areas above grade. For added resiliency, lay 1/2" cork insulation board, or Cork-Pak in mastic before laying finished floor.

B. CLASSROOMS—Lay 25/32" thick Ironbound Continuous Strip Flat-Grain Hard Maple 2nd & Btr. Grade. Only one width and length shall be used in each area excepting at closures.

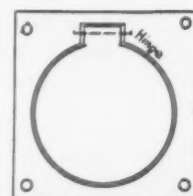
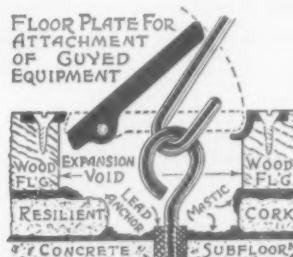
C. SHOPS—Lay 33/32", 1 1/4" or thicker Edge-Grain or 33/32" or 41/32" Flat Grain Ironbound Continuous Strip in 2nd & Btr. or 3rd & Btr. Grade (specify which).

D. LIBRARY AND OFFICES—Lay Par-K Wood Tile Unit Block 25/32" thick 2nd & Btr. Grade Hard Maple, Beech or Birch, or Select & Btr. Grade Oak (specify which). The size of square to be 6 3/4 x 6 3/4, or 7 1/2 x 7 1/2, or 8 x 8, or 9 x 9, or 10 x 10. Only one size may be used in any given area.

7. **Sanding**—All wood flooring shall be sanded to a smooth, even surface. The finish cut shall be made with a No. 0 or finer paper.

8. **Finish**—Immediately after sanding, flooring is to be given two coats of approved penetrating sealer, to be applied evenly so as not to flood the floor. Each coat shall be thoroughly buffed in.

In gymnasiums apply one coat of sealer. The court markings and subsequent coats of special gymnasium finish may then be applied by others.



Appears in Gym Floor Floor Plate as It Appears Approx. 4" x 4"

IRONBOUND PRODUCTS are covered by U. S. Patents 1,864,744; 1,940,377; 1,946,646; 2,026,511; and others pending; and by "IRONBOUND" and "CORKUSHION" trademark, Registered in U. S. Pat. Off.—all owned by STORM FLOORING CO., INC. of New York. Guaranteed installations are made by the owners and by experienced flooring contractors throughout U. S. A.



# WOOSTER PRODUCTS INCORPORATED

Wooster, Ohio



## A sure STEP needs a good TREAD and **WOOSTER**

### IS A GOOD TREAD

Sixteen per cent (16%) of all student accidents happen on stairs. According to statistics of the National Safety Council, a high percentage of stair accidents are due to worn, irregular steps and to unsafe stairway construction. More persons are injured by falling and slipping than any other type accident.

Wooster treads eliminate the danger zones and common hazards of stairs, landing ramps and hallways. These places can be made safer and more attractive with Wooster treads and floor plates. Installation can be made quickly and easily over any type step construction — wood, concrete, steel, cement. The design and craftsmanship built into Wooster treads permits easy installation and long lasting serviceability. No other tread adds so much in general appearance — no other tread wears as long and serves so efficiently.

Years of experience and research are emphasized in the famous Wooster Safety Tread which provides the maximum anti-slip protection possible ... a specially built surface not affected by water or oily substances.

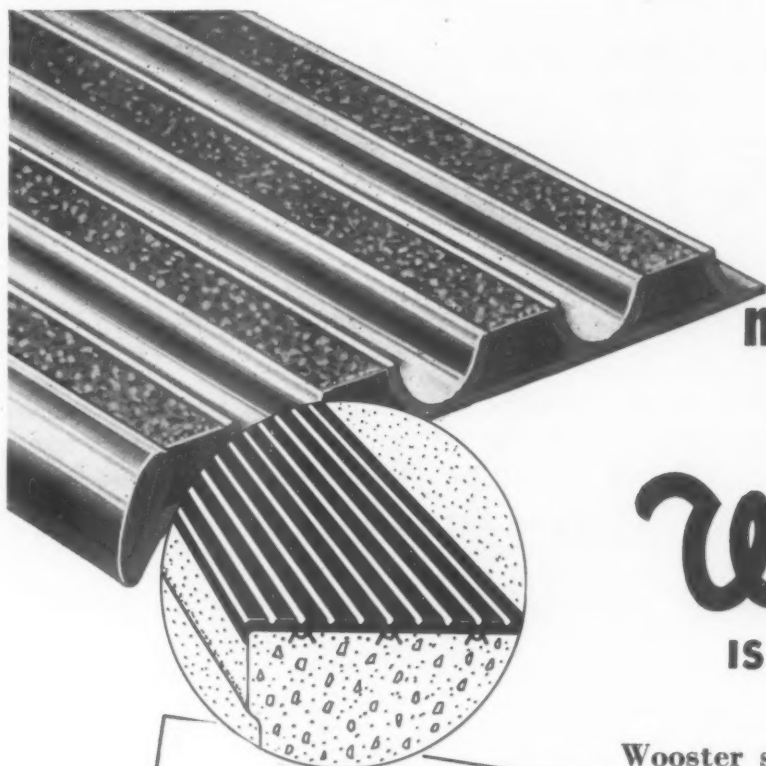
# WOOSTER

PRODUCTS INCORPORATED,

WOOSTER, OHIO

- Stair Treads and Nosings
- Safegroove Treads
- Treads — Abrasive Cast
- Floor — Platform & Trench Plates — Abrasive Cast
- Thresholds — Abrasive Cast
- Thresholds — Extruded Metal
- Elevator Door Sills — Abrasive Cast
- Curb Bars — Abrasive Cast

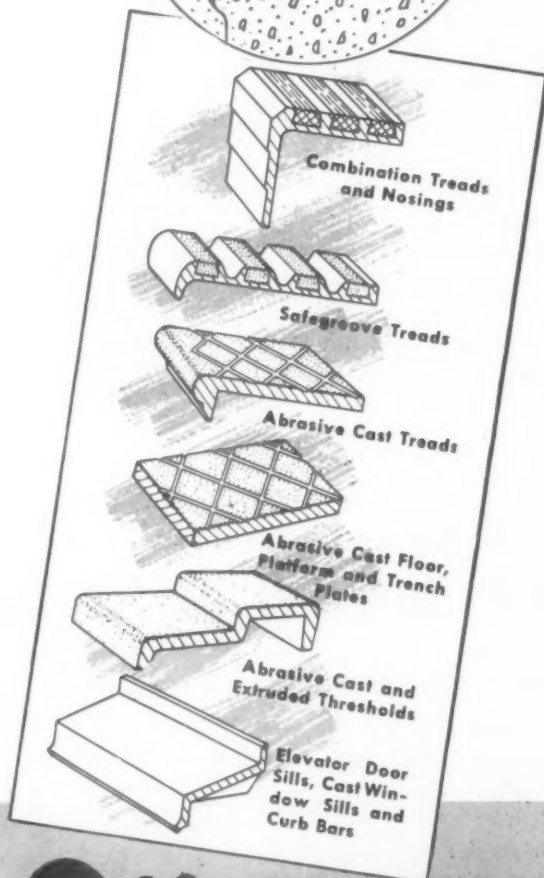
Wooster abrasive cast treads are available in abrasive iron, abrasive aluminum, or abrasive bronze. Wooster extruded groove treads are available in yellow brass or aluminum, with either abrasive grit or lead anti-slip piller.



A good TREAD  
makes a SURE step  
and  
**WOOSTER**  
IS A GOOD TREAD

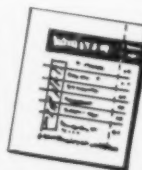
Wooster safety treads with the positive anti-slip surfaces are available in two different types of construction and materials — extruded safe groove treads, and abrasive cast treads.

Wooster Products are in use in over 100,000 places throughout the world, in institutions, schools, industrial plants — most of which are used continuously for heavy every day foot traffic. These installations of safety treads, floor plates, thresholds, door and window sills, and curb bars are long lasting monuments to Wooster craftsmanship and durability.



**WOOSTER**  
PRODUCTS INCORPORATED,  
WOOSTER, OHIO

Send for the complete illustrated catalog, and specification portfolio, with details of product, descriptions, and easy installation methods.



Write or phone Wooster Products Inc., Wooster, Ohio, and your packet will be sent immediately.

# AMERICAN FLOOR PRODUCTS CO.

1520 "M" Street, N. W.

Washington 5, D. C.

## Specialists in Floor Mats for Every School Need

for

- ENTRANCES
- CORRIDORS

- STAIRWAYS
- RAMPS

- ATHLETIC DEPTS.
- CAFETERIAS, ETC.

from

RUBBER — NEOPRENE — FABRICS — STEEL — COCOA FIBRE — LEATHER — PLASTICS



- FOR BEAUTIFUL ENTRANCES:—

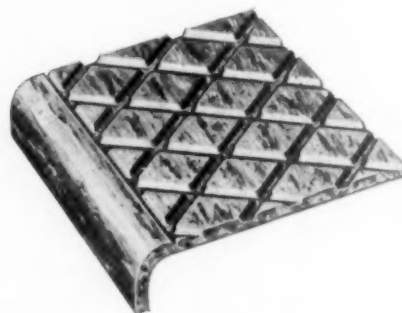
### AMERICAN RUBBER LINK MATS

- Made in 10 colors,
- Built to any practicable size and shape,
- With beveled NON-TRIP nosings on all sides,
- Reversible for wear on both sides,
- Thickness —  $\frac{1}{2}$ " overall,
- Fits  $\frac{3}{8}$ " deep mat recesses.

- FOR SAFE, DURABLE STAIRWAYS:—

### ARMOR-TREDS AND LANDING TILE

- Colors — Plain BLACK and marbled BROWN — GREY — GREEN — TERRA COTTA — BLACK.
- Width —  $12\frac{1}{2}$ " standard cut to widths desired.
- Length — 36", 48" and 62" cut to lengths desired.
- Thickness —  $\frac{1}{4}$ " only.
- Landing Tile 26" x 26" of matching colors and design.

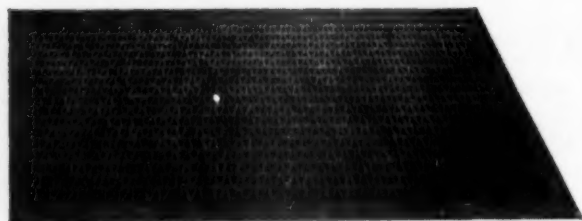


- FOR RUGGED ENTRANCE USES:—

### ARMOR-LINK TIRE FABRIC MATS

- Black color only.
- Built to any practicable size and shape.
- With beveled NON-TRIP nosing optional.
- Thickness —  $\frac{5}{8}$ " fits  $\frac{1}{2}$ " deep mat recesses.
- Stock Sizes: 

14" x 22"	17" x 25"
20" x 30"	24" x 37"
	30" x 48"



Write for Prices, Catalog, and Handy File Folder

**"MATS — ABRASIVES"**

FOR

**PROTECTION COMPLETE — WHEREVER FLOORS MEET FEET**

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



# STRUCTURAL WATERPROOFING CORP.

*Engineers and Contractors*

General Offices: 1619 Builders Building, Chicago 1, Ill.

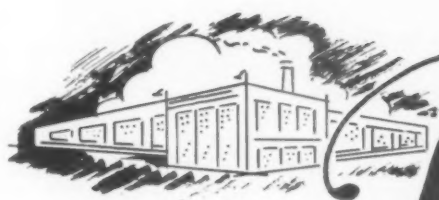
NEW YORK CITY  
163 E. 69th St.

DALLAS  
Santa Fe Building

MEMPHIS  
Sterick Building

ATLANTA  
Hurt Building

HOUSTON  
M. & M. Building



# Bonded Waterproofing

AND

## EXTERIOR RESTORATION

*Use Bishop Restoration Methods*

"THE FINEST PROTECTION AGAINST WEATHER AND CLIMATE"

Avoid costly damage to buildings! Start your maintenance program with exterior walls.

Waterproofing arrests and forestalls disintegration of plaster and other interior finishes, rusting of structural steel, steel and wood sash,

fire escape anchors, and damage to elevator machinery.

Over thirty years' experience in waterproofing, stone and terra cotta repointing, tuckpointing, stucco and concrete restoration is available to you through our Bishop Methods and National Services.

*Write Today --- Delay is costly*

**FREE SURVEYS AND ESTIMATES.. WITHOUT OBLIGATION**

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

## WESTERN WATERPROOFING COMPANIES

Licensed Appliers of "Resto-Crete" \* and "Ironite" \*

The Western Waterproofing Companies are made up of the following independent corporations with offices conveniently located as follows:

**BOSTON, Dept. H**  
82 West Dedham Street  
Boston 18, Mass.

**NEW YORK, Dept. H**  
441 Lexington Avenue  
New York 17, N. Y.

**DETROIT, Dept. H**  
9960 Freeland  
Detroit 27, Mich.

———— New York Corporation ————

———— Michigan Corporation ————

## PROTECT FINE BUILDINGS FROM MOISTURE DAMAGE

Prompt remedial weatherproofing and waterproofing at the first sign of leakage or seepage will save thousands of dollars in future extensive repairs.

Sub-surface waterproofing of leaking basement floors and walls or other underground masonry which may be subject to varying degrees of hydrostatic pressure can be successfully treated by expert Western-trained mechanics with "IRONITE."\*

Brick, concrete, stone, stucco, and terra-cotta wall surfaces above grade can be restored and preserved by the expert application of "RESTO-CRETE,"\* by Western's experienced workmen directed by Western's engineers.

Proved methods, superior materials, technical ability and engineering skill—and the most complete equipment in the industry have given Western an outstanding reputation for leadership in weatherproofing engineering and contracting.

**Contact the nearest Western Office for  
a survey and report on your property.  
There's no obligation.**

\* Reg. U. S. Pat. Off.

The many fine buildings of great architectural and historical significance owned by our schools, colleges, and universities need constant watchfulness and protective measures to prevent moisture-damage from deteriorated or porous masonry.

Their walls of brick, stone, terra cotta or concrete, and the mortar that bonds them, are subject to the ravages of time, weather and climate. Moisture penetration, seepage, and surface cracks can cause extensive damage and costly repairs.

Weatherproofing and waterproofing, both below-grade and above-grade, and other restorative and preservative measures are needed to keep their exterior and interior surfaces resistant to the never-ending processes of attrition and disintegration.

We maintain a system of inspection and protective measures which helps to minimize the expense of masonry up-keep. It costs nothing, and there is no obligation, to have our engineers make this inspection—and it may cost a great deal to neglect taking this precaution. Contact our nearest office about this protective service.

**For Over 30 Years, Western Waterproofing Engineers Have Been  
Devising and Applying Successful Scientific Safeguards to Buildings  
of All Types, Under Every Sort and Condition of Climate and Weather.**

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# THOROSEAL

" PREVENTION of water problems,—more important than CORRECTION "



Euclid Senior High School, Euclid, Ohio. Architect—Harry A. Fulton, Cleveland, Ohio.

Associate Architects—Ben Krinsky and R. B. Dela Motte, Cleveland, Ohio.

## *All masonry needs protection!*

Beginning the construction of Euclid Senior High School, Euclid, Ohio. The National Concrete Fireproofing Company and R. P. Carbone Construction Company, General Contractors, Cleveland, Ohio used THOROSEAL, WATERPLUG and QUICKSEAL, for masonry protection and waterproofing, as specified, throughout building.



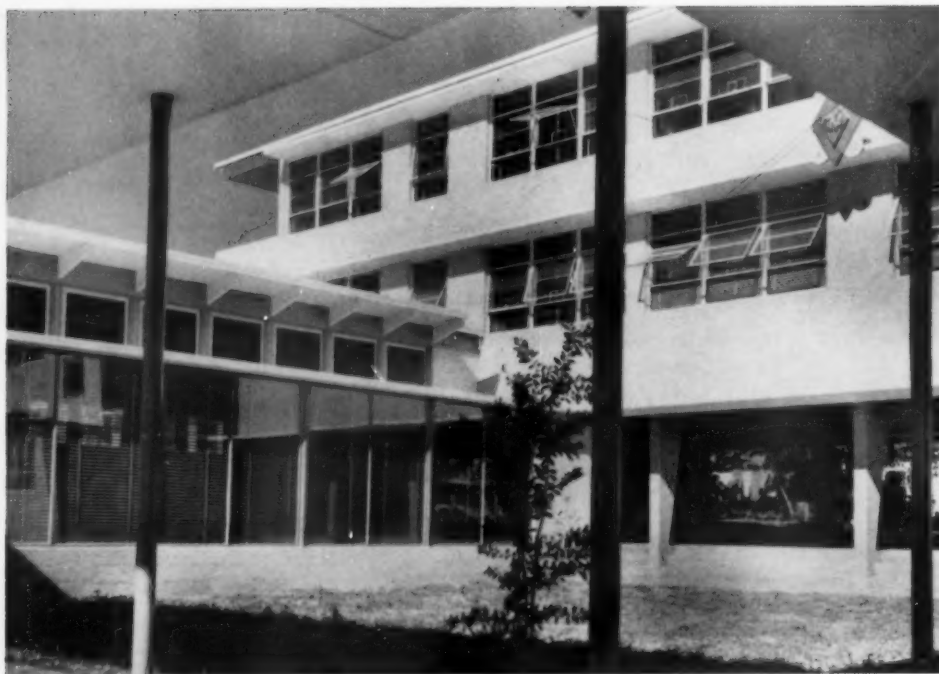
Foundations to roof protected with THOROSEAL.

**STANDARD DRY  
WALL PRODUCTS**  
NEW EAGLE, PENNA.

Write for our 20 page brochure, pictorially describing masonry problems, and specification writer's wall chart.



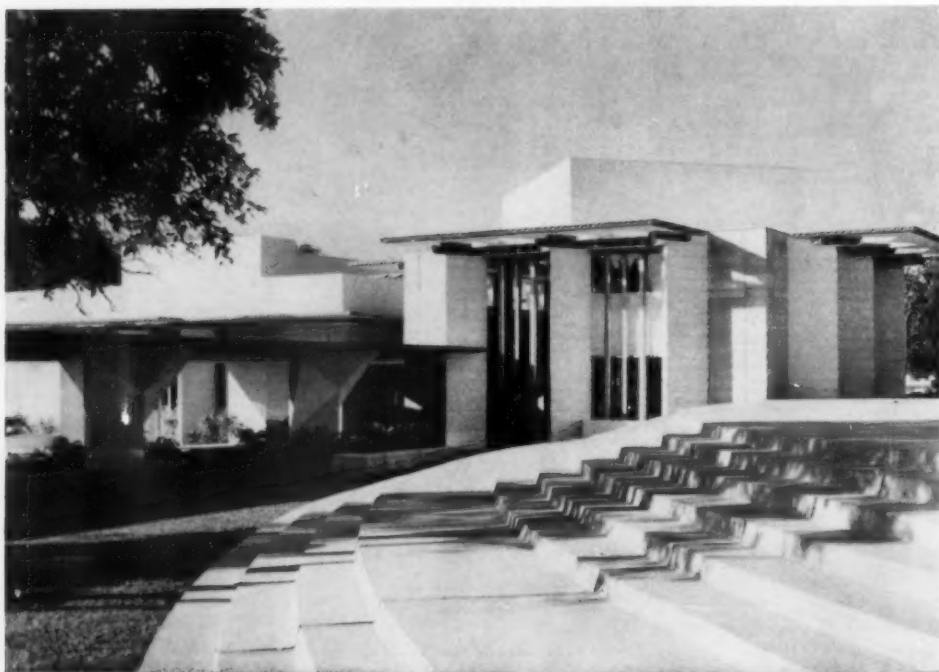




## **Incentive for Higher Learning**

Beautiful buildings, pleasant surroundings give incentive and courage to those who are to make America strong and free.

# *Beautiful* **THOROSEALED Schools and Universities**



Administration Building, Southern Methodist College, Lakeland, Florida. Architect — Frank Lloyd Wright.

**Standard Dry Wall Products Inc.**  
**BOX X, NEW EAGLE, PENNSYLVANIA**



## Designed by Robert Law Weed *Architect, Miami, Florida*

### Inside, Outside—

General view of new dormitories Southern Methodist College on banks of Lake Hollingsworth, Lakeland, Florida. All buildings THOROSEALED. Architect, Robert Law Weed, Miami, Florida.



**WATERPLUG**  
To Stop Leaks

**THOROSEAL**  
Seals the Surface

**QUICKSEAL**  
A Beautiful Finish

**STANDARD DRY  
WALL PRODUCTS**  
NEW EAGLE, PENNA.

Write for our 20 page brochure, pictorially describing masonry problems, and specification writer's wall chart.



# All Masonry Needs Protection



Deer Park Exempted School, Deer Park, Ohio. Contractor—  
Frank Messer & Sons, Inc., Cincinnati, Ohio.

All masonry protection and waterproofing by The THORO  
System, THOROSEAL, WATERPLUG and QUICKSEAL.

## The THORO SYSTEM of Masonry Protection



THOROSEAL, for interior finish and exterior masonry  
protection, gives more schools at reasonable cost.

Better understanding of a broader freedom is created by  
more and better public schools.

### WATERPLUG

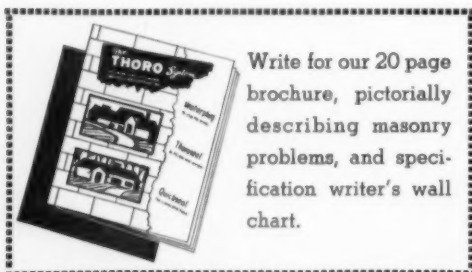
*Stops the leaks*

### THOROSEAL

*Seals the surface*

### QUICKSEAL

*A beautiful finish*

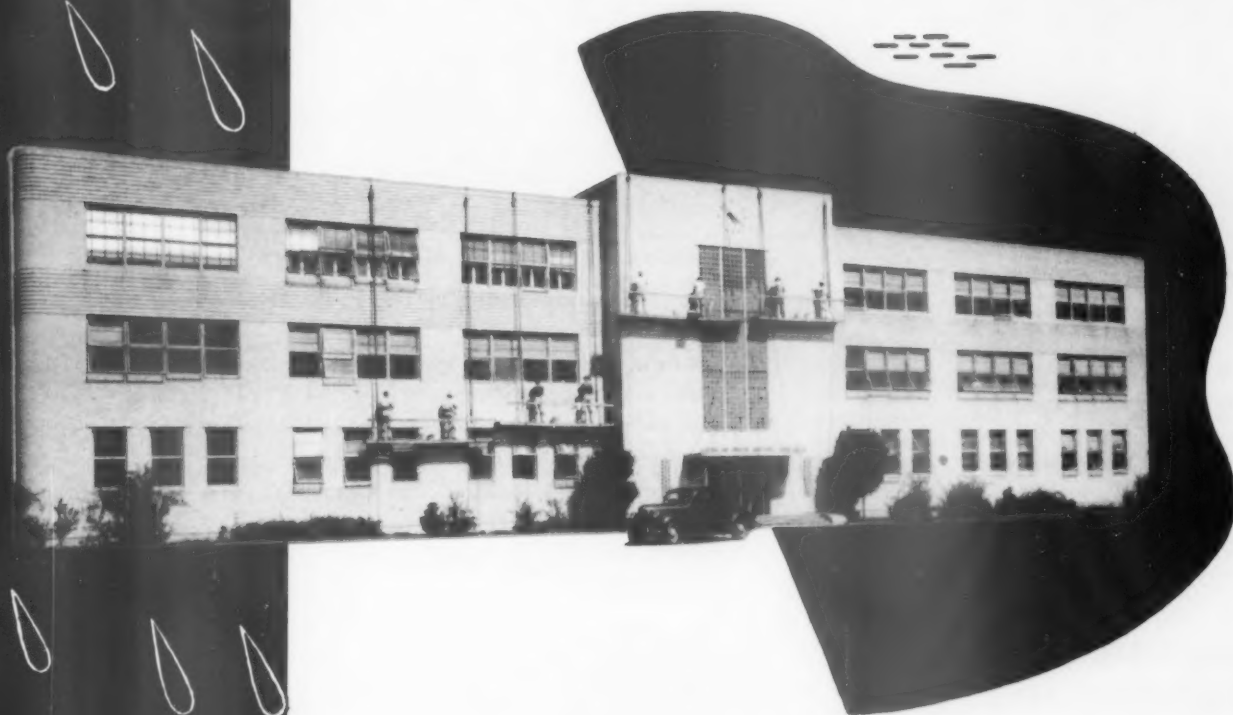


Write for our 20 page  
brochure, pictorially  
describing masonry  
problems, and speci-  
fication writer's wall  
chart.

**Standard Dry Wall Products Inc.**  
**BOX X, NEW EAGLE, PENNSYLVANIA**



# LASTING PROTECTION AND BEAUTY FOR YOUR SCHOOL PROPERTY



*through...*

**Weather and Water  
Damage Protection**

**Building Restoration**

**Concrete Restoration**

**Tuckpointing**

**Building Cleaning**

**WESTERN  
WATERPROOFING CO.**

*Engineers and Contractors*

Syndicate Trust Bldg.

St. Louis 1, Missouri

A MISSOURI CORPORATION GIVING NATION-WIDE SERVICE

# ADD YEARS OF EXTRA USE TO YOUR SCHOOL BUILDINGS WITH

## CAUSES AND INDICATIONS OF WEATHER DAMAGE

Your school buildings—whether in a small rural community or a great university group—are in constant danger due to continual exposure to weather and water damage. Some of the “cancerous” hazards you must face are—weather change with resultant freezing and thawing . . . neglected maintenance . . . wet walls . . . water seepage . . . all of which lead directly to crumbling mortar joints, cracking walls, disintegrating masonry and spalling concrete—and large repair costs that can be avoided.

## BENEFITS OF PROPER RESTORATIVE OR PREVENTIVE PROTECTION

Here's how you can check this destructive process, however. Western Waterproofing Company, through *preventive* methods for new buildings, and *restorative* methods for older ones, assures your property years of additional life and beauty. Their restoration actually renews the original appearance and at the same time it strengthens the physical structure. Natural deterioration is checked . . . because Western Waterproofing Company goes to the *source* of the problem. Then you can expect lower maintenance cost—and avoid needless new construction.

## ENGINEER'S ANALYSIS AND RECOMMENDATION

You can easily obtain an obligation-free, thorough analysis of your property from a Western Waterproofing Company engineer. He'll look it over—inside and out, basement to roof—taking into consideration the weather . . . your structure's age . . . its use . . . its environment. He'll learn your structure's *particular* needs, discuss them with your architect, and then make the necessary recommendations to you, your school board, or committee.

### MEN, METHODS, MATERIALS—JOINED TO SAVE YOUR PROPERTY



#### TRAINED MEN

*To Skillfully Treat Your Property...*

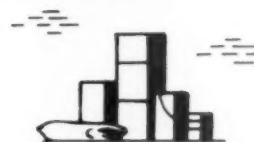
Western's technicians, experienced in restoration of disintegrated masonry, utilize the know-how gained by 35 years successful practice. May we show you the caliber of their work on a job near you?



#### TESTED METHODS

*To Save You Thousands of Dollars Annually...*

Western engineers, versed in building construction, are readily able to recognize causes of deterioration—and to recommend proper methods of protection or restoration.



#### SUPERIOR MATERIALS

*To Increase the Life of Your Buildings...*

Western materials, compounded in the laboratory, have proven their advantages by years of successful application. Doubly effective, they decorate as well as protect your building.

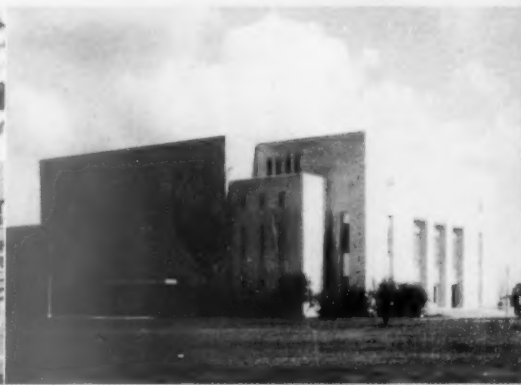
# H ... WESTERN WATERPROOFING COMPANY'S SERVICES



High School  
Little Rock, Arkansas



Marillac Seminary  
St. Louis County, Mo.



Louisiana State University  
Lake Charles, La.

## WESTERN WATERPROOFING COMPANY'S SERVICE

### SUB-SURFACE WATER PROTECTION using genuine IRONITE

- New or old structures — all masonry surfaces in contact with the earth
- Basements, pools, underground passageways — against hydrostatic head

### EXTERIOR WEATHER PROTECTION Using Gun or Hand-Applied RESTO-CRETE\*

- New and old structures — above ground
- Abutments, bleachers, gymnasiums, stadia, retaining walls

### BUILDING RESTORATION and MAINTENANCE

- Restoration of walls: Concrete, Brick, Stone, Terra Cotta, etc.
- Beams, Columns, Window Sills, Caps
- Wet interior walls made dry

### Protection Against INTERIOR WALL DAMPNESS With Western PARGE COAT

- For interior surfaces of all above-ground exterior walls
- Designed for new construction as well as old

### MORTAR JOINT TREATMENT With DILATO Expanding Mortar

- Tuckpointing assures lasting mortar joints
- Retards mortar deterioration and moisture damage

### BUILDING CLEANING

- Stain removals with proper chemicals and materials
- Steam-Vapor Process or Sand-Cleaning Methods

\*Reg. T. M.



Southwest High School  
St. Louis, Mo.



Jesuit High School  
New Orleans, La.



Spring Hill College  
Mobile, Alabama



## YEARS OF EXPERIENCE WITH EVERY TYPE BUILDING



For over 35 years Western Waterproofing Company has worked successfully with architects and leading businessmen in treating buildings of all types—office buildings, banks, residences, churches, factories, grain elevators, and others. All have profited by prompt restorative, remedial, and preventive action. A few of Western Waterproofing Company's better-known clients include:

General Motors  
Bell Telephone System  
National Biscuit

Standard Oil Co.  
General Mills  
General Foods

Union Pacific Railroad  
Coca-Cola Co.  
Shell Oil Co.

## INCLUDING HUNDREDS OF SCHOOLS...



There are hundreds of schools—all sizes and types existing in every part of the country—that have gained lasting beauty and strength from Western Waterproofing Company's protective and restorative services. Only a few are listed here:

Southwest High School  
(St. L.)  
Kirksville Teachers  
College  
Mo. School of Mines  
(Rolla)  
Catley College,  
Nevada, Mo.  
Grinnell College, Iowa  
Normandy High School  
Ritenour High School  
Washington School,  
Cairo, Ill.  
Loyola Univ.,  
New Orleans  
East Junior High, Alton  
Sumner High, Cairo, Ill.

Spring Hill College,  
Mobile  
Mo. School of Blind  
S.M.U., Dallas, Texas  
Elementary schools,  
Columbia  
Board of Education,  
Murphysboro, Ill.  
A. and M. College,  
Magnolia, Ark.  
St. Vincent's,  
Vincennes, Ind.  
Board of Education,  
Chester, Ill.  
Lincoln University,  
Jefferson City  
Ursuline College  
Central Inst. for Deaf,  
St. Louis

Texas Tech, Lubbock, Tex  
Highland Pk. High, Dallas  
Lafayette School,  
New Orleans  
Texas A. & M., Bryan  
Old Parish School,  
Vincennes  
St. Jas. School, Cairo  
Sikeston (Mo.) High  
Washington U., St. L.  
Marillac Seminary, St. L.  
L. S. U., Baton Rouge, La.  
Jesuit High, New Orleans  
Taylorville (Ill.) High  
Ragsdale School, Atlanta  
Brenau College,  
Gainesville, Ga.

## ASSURE PROPER TREATMENT FOR YOUR PROPERTY



There's no time like the present—and every day you wait, the greater impact weather and water damage can make on your property—and the costlier your eventual repairs. Western Waterproofing Company's trained men, tested methods, and superior materials are available to give your school property lasting protection and beauty—and to save you many dollars in maintenance costs. So send in the enclosed reply card now for a survey by a Western Waterproofing Company engineer. No obligation, of course.

# WESTERN

## WATERPROOFING CO.

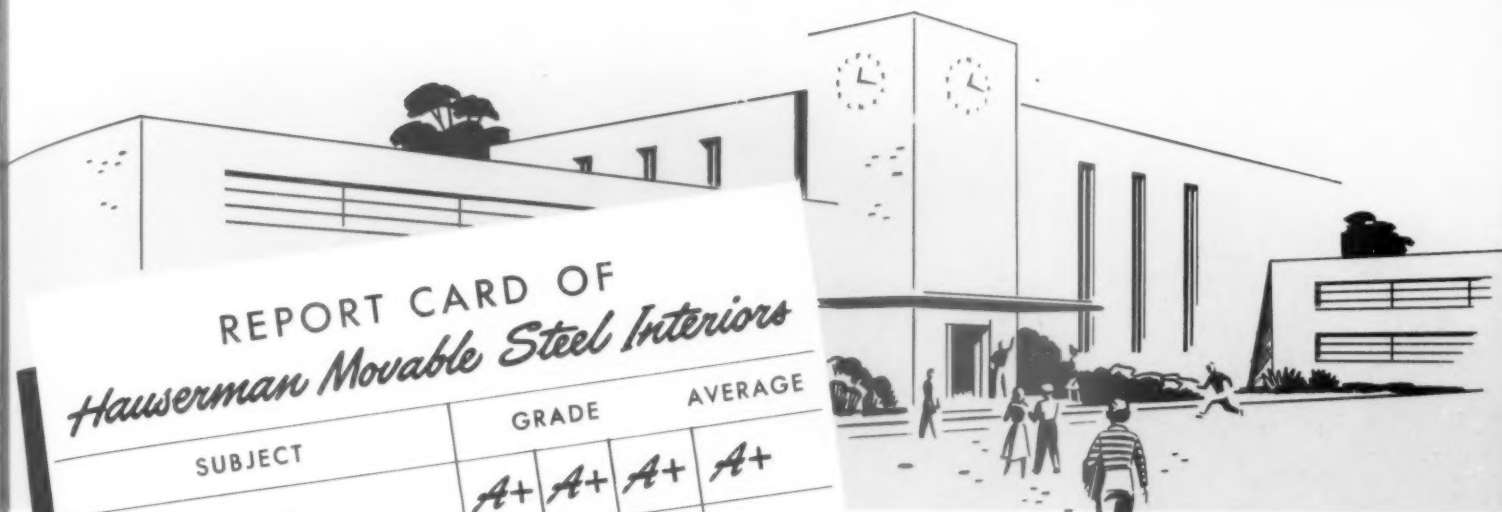
*Engineers and Contractors*

Syndicate Trust Bldg.

St. Louis 1, Missouri

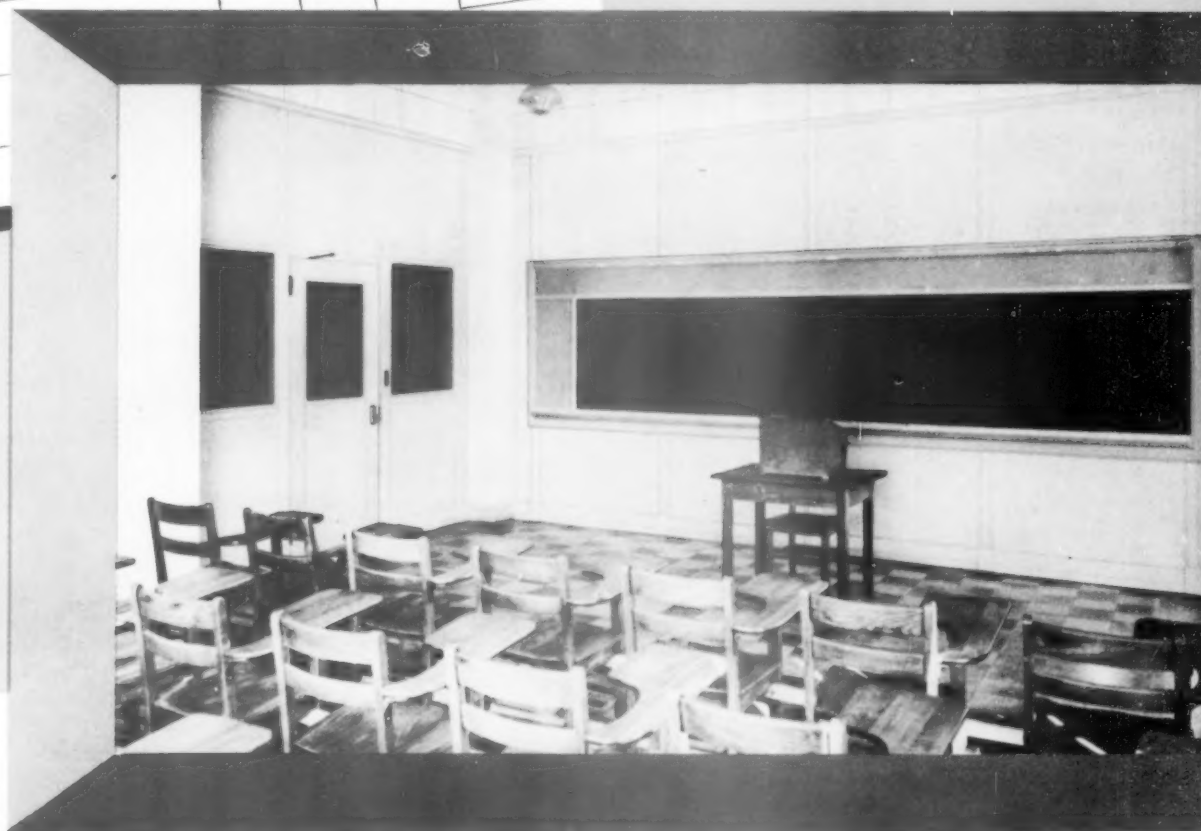
A MISSOURI CORPORATION GIVING NATION-WIDE SERVICE

BRANCHES AND RESIDENT ENGINEERS IN: KANSAS CITY, MO. • SPRINGFIELD, ILL. • ATLANTA, GA. • CHARLOTTE, N. C.  
MIAMI, FLA. • NEW ORLEANS, LA. • LITTLE ROCK, ARK. • EVANSVILLE, IND. • DALLAS, TEXAS • HOUSTON, TEXAS  
DES MOINES, IOWA • MINNEAPOLIS, MINN. • BIRMINGHAM, ALA.



# REPORT CARD OF *Hauserman Movable Steel Interiors*

SUBJECT	GRADE			AVERAGE
APPEARANCE	A+	A+	A+	A+
SOUNDPROOFNESS	A+	A+	A+	A+
LOW MAINTENANCE COSTS	A+	A+	A+	A+
MOVABILITY	A+	A+	A+	A+
INCOMBUSTIBILITY	A+	A+	A+	A+
SOLID CONSTRUCTION	A+	A+	A+	A+



*A Typical Hauserman Movable Steel Interior Classroom Installation*

# ...For CLASSROOMS • SHOPS • CORRIDORS

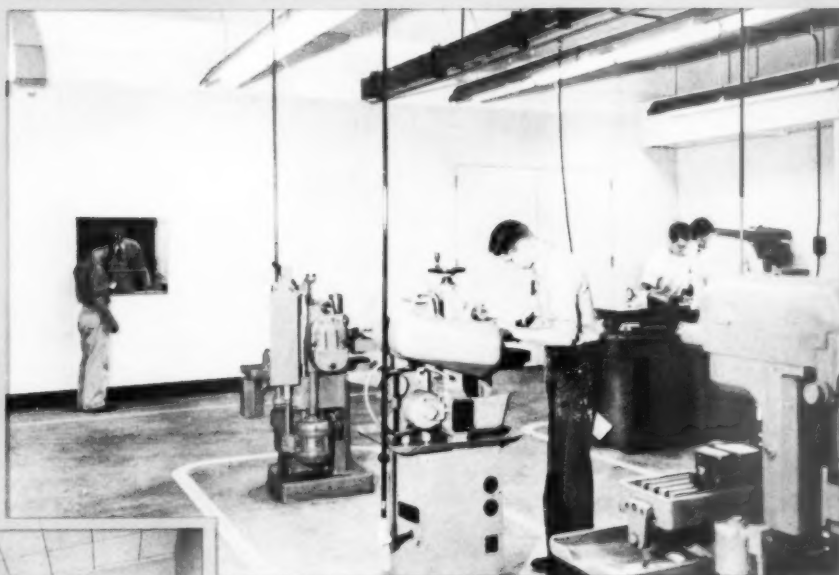


## **A+ IN APPEARANCE**

There are several modern, functional interior styles to choose from that will meet every school requirement. And there are over 500 beautiful colors that range from natural hues through the pastels to match any decorating scheme. All of these finishes are baked-on to last a lifetime.

## **A+ IN SOUNDPROOFNESS**

These solid, rigid interiors minimize sounds in two ways. Hauserman *Movable Steel Walls* keep out more inter-classroom noise than tile and plaster construction, yet are only half as thick. And Hauserman *Acoustic Steel Pan Ceilings* absorb approximately 85% of all the sounds that strike them.



## **A+ IN LOW MAINTENANCE COSTS**

These handsome walls won't chip, crack, warp or scale. They save thousands of dollars by eliminating the need for patching and repainting. Independent laboratory tests prove that Hauserman's baked-on finishes will withstand 400,000 washings with commercial cleaning solvents.



## DRAFTING ROOMS • LABORATORIES • DORMITORIES

### **A+** IN MOVABILITY

Whenever new floor layouts will promote greater teaching efficiencies, Hauserman Steel Walls are quickly moved. There's no muss or fuss and all units can be completely re-used.



### **A+** IN INCOMBUSTIBILITY

Hauserman *Movable Steel Interiors* assure adequate fire resistance from baseboard to roof. Steel for frames and panels . . . glass for through vision and borrowed light . . . rockwool insulation for sound absorption and sound-proofing . . . steel for top fillers . . . all are totally incombustible. Hauserman *Movable Steel Interiors* increase fire safety and reduce the fire hazard in any building.



### **OTHER ADVANTAGES**

*Earlier Occupancy* . . . all units arrive at your building completely finished and ready-to-install; there's no waiting for several coats of plaster and paint to dry. *Complete Accessories* . . . to meet every operating and construction requirement. *Built-in Wiring Accommodations* . . . save on initial wiring costs and subsequent changes. *Unit Panel Construction* . . . single units can be quickly removed and replaced for utility inspection and repairs.

### **A+** IN SOLID CONSTRUCTION

Hauserman *Movable Steel Interiors* are strong, rigid, yet comparatively light in weight. They look like permanent walls and have a solid *feel*. What's more, Hauserman *Movable Steel Interiors* are capable of absorbing more abuse than conventional interiors.



# The Hauserman Organization

The E. F. Hauserman Company engineers, produces, installs and services all of its products wherever they are used. Our engineers are always available to assist you with any phase of interior planning.

Movable Partitions • Wainscot • Acoustic Steel Pan Ceilings  
Movable Railings • Partition Doors and a Complete Line of Accessories

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Partitions • Wainscot  
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THE E. F. HAUSERMAN CO. • 6956 GRANT AVENUE, CLEVELAND 5, OHIO

... movable steel partitions  
and paneling for all interiors



**MARTIN-PARRY**  
**METLWAL**



# Here's a faster way to partition and panel!

## MARTIN-PARRY

# METLWALS



By use of only a few standard parts — from warehouse stocks — you can quickly divide floor space and cover interior walls with Martin-Parry Metlwal Movable Partitions and Paneling. That means faster, cleaner, safer, simpler installation—permanent, yet easily movable without waste when a floor plan must be changed.

M/P Metlwals provide an all-flush surface from floor to ceiling and can be used successfully as wainscoting. They eliminate the need for plaster in new construction and for filler boards of other materials at ends or above cornice level. They combine rich beauty, quiet, and fire resistance with low initial cost, permanence, economy, easy maintenance and superior sanitary protection. These Bond-erized steel units are easily adaptable to an endless variety of new, modern decorative effects — give you a free hand in planning distinctive interiors for new construction or modernization work in buildings of every kind.

The face sheets of M/P Metlwal Movable Partitions and Paneling are pre-decorated, factory finished in natural woodgrain reproductions or baked enamel finishes in a variety of colors. These beautiful surfaces will not chip, crack or craze; *do not reflect harsh, metallic light*. And all panels and parts are Bonderized against rust and corrosion.



Ceiling-High Partitions are flush-type, full 4" thick running from floor to ceiling. They have all the appearances of solid walls, yet may be moved easily with little or no waste. Furnished in all steel, or steel and glass, with solid or glazed doors, hardware and other accessories. Removable base gives easy access to wiring.



Cornice-High Partitions are identical to ceiling-high partitions except for cornice line. They are ideal for semi-private offices. All parts are completely interchangeable and may be moved again and again, as revision of space is required.



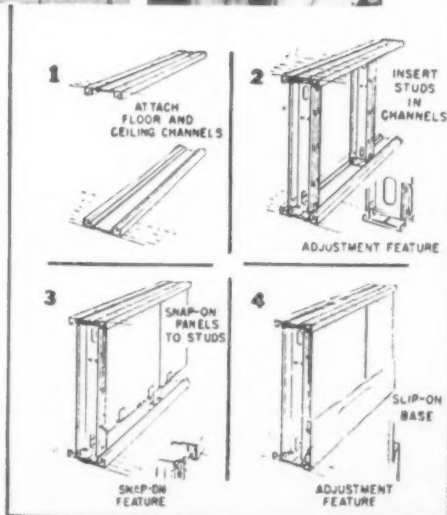
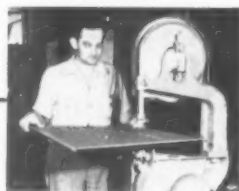
## METLWAL PANELS ARE INTERCHANGEABLE FOR PANELING and PARTITIONS

The basic Metlwal panel is modular, using a standard 24" width. It consists of an asbestos-lined steel sheet with corrugated steel backing. No preliminary preparation is necessary for installing M/P Metlwals. The *four* major steps are shown below. Every facility for wiring is provided, even to the added convenience of slotted holes in the studs. All panels and studs may be cut on the job with a saw. And, since the Metlwal panel weighs only 2 1/4 lbs. per square foot, it can be handled in full-size (24" x 93") by one man.

Since *all* units are standard, they are interchangeable. Panels may be quickly and easily removed, separately, *without disturbing the other panels.*



Below, left: Snapping Metlwal paneling on continuous clip. Right: Cutting panels to fit. Diagram: Method of installing Metlwal partitions.



## METLWAL IS THE IDEAL PARTITIONING and PANELING For

### Institutions:

Existing Offices and Wards, Corridors, Kitchens, Dining Rooms, Operating Rooms, Entrance Halls, Reception Rooms, Lobbies, Washrooms, Supply Rooms.

### Theatres:

Lobbies, Foyers, Existing Offices, Powder Rooms, Smoking Rooms, Auditoriums.

### Hotels and Restaurants:

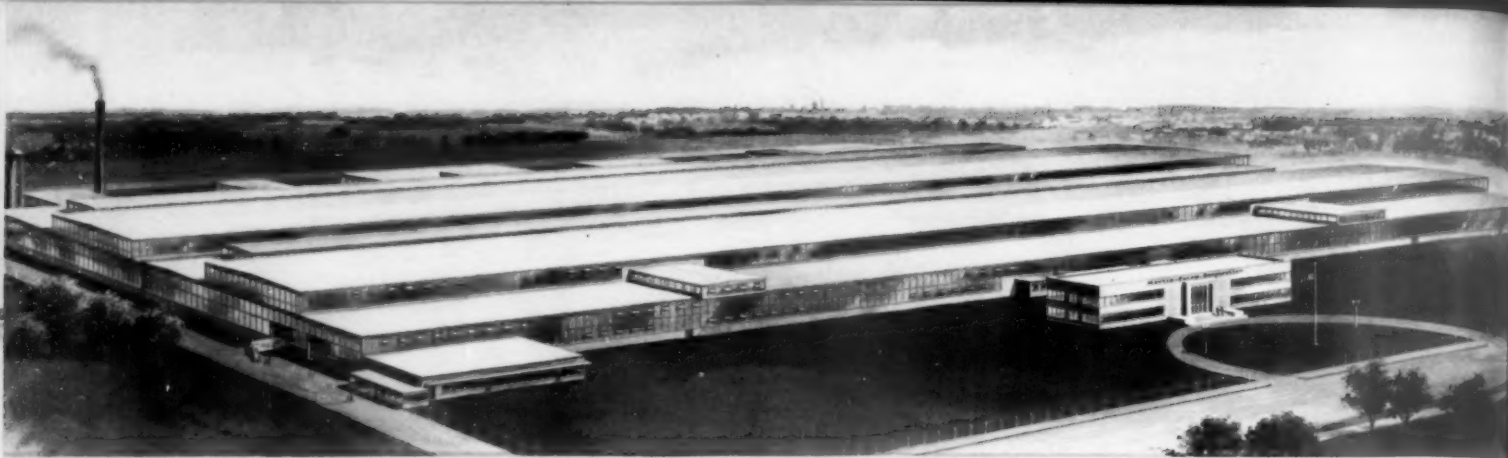
Kitchens, Corridors, Rest Rooms, Lobbies, Grills, Dining Rooms, Cocktail Lounges.

### Auto Sales and Service:

Sales Rooms, Rest Rooms, Lubritorium, Offices, Counters, Displays.

### Industrial Plants:

Medical Rooms, Cafeterias, Reception Rooms, Conference Rooms, Existing Offices, Washrooms, Displays.



Metlwals are manufactured in this mammoth Martin-Parry plant, Toledo, Ohio

## MARTIN-PARRY METLWALS OFFER YOU EXTRA VALUE

### CHECK THESE ADVANTAGES:

#### *Metlwal Paneling*

1. One standard 2' x 8' size—minimum waste. Easy to handle, store and apply.
2. Simple attachment to wall with continuous clip—panels snap on.
3. Flush surface—"V" joints—no mouldings necessary except top and bottom trim.
4. Applied to any wall or framing with minimum preparation.
5. Permanent, baked-on enamel finish or photographic wood-grains.
6. Flexible—panels may be removed and re-located without waste.
7. Fireproof—even to temperatures up to 1700° F.
8. Metlwal paneling can be cut to fit on the job to meet job conditions.
9. Snap-on feature—immediate application of 16 sq. ft. of wall surface.
10. Low labor and material cost.

#### *Metlwal Partitioning*

1. Individually custom built installation.
2. Adaptability to changes in job conditions.
3. Standard two foot panel sections.
4. All parts Bonderized for rust resistance.
5. Lifelike photographic wood grain finishes.
6. Resilient panel surface for sound dampening and protection from traffic.
7. Full 4" flush partition with 3 1/2" dead air space for concealed wiring and piping.
8. Standard panel used for filler at ends and above cornice.
9. Standard panels used in wainscoting or partition.
10. Provision for grilles or standard electrical outlets in panel surfaces.



**M/P NATION-WIDE SERVICE** MARTIN-PARRY Distributors located in principal cities throughout the nation provide complete Sales, Engineering and Erection Service.

70 YEARS OF SERVICE

**MARTIN-PARRY CORPORATION**  
BOX 964 TOLEDO, OHIO



# FLUID SYSTEMS, INC.

1881 Dixwell Avenue • New Haven 14, Conn.  
**THERMAL ELECTRIC SYSTEM for Bunker Oil Transport**  
 FLUID SYSTEMS and THERMAL ELECTRIC are Trade Marks, Reg. U.S. Pat. Off. and U.S. Patent No. 2,224,403

*Simplicity and Guaranteed Performance with*  
**"THERMAL ELECTRIC"**  
*in a*  
**SCHOOL HEATING SYSTEM**  
 using lowest-cost Bunker Oil fuel

Oil firing of school heating plants is an important element of total school operation. The oil burning system must be completely and dependably automatic because of off-hour heating demand, extended shut-down during night, week-end, and vacation periods, and the fact that operating personnel are not necessarily trained to service complicated and temperamental mechanisms.

Large annual consumption usually demands installation of an oil burning system using heavy residual fuels. Their higher heat content, combined with lower cost per gallon, results in maximum economy.

Considerable trouble has been experienced with No. 6 fuel (Bunker C) in the past. This fuel must be pre-heated, and complicated arrangements by questionable experts have failed to provide dependable automatic starting. Substitution of "free-flowing" No. 5 fuel at higher cost is no longer advisable, since that fuel is now a blend of unpredictable variations with the same operating problems as No. 6 oil.

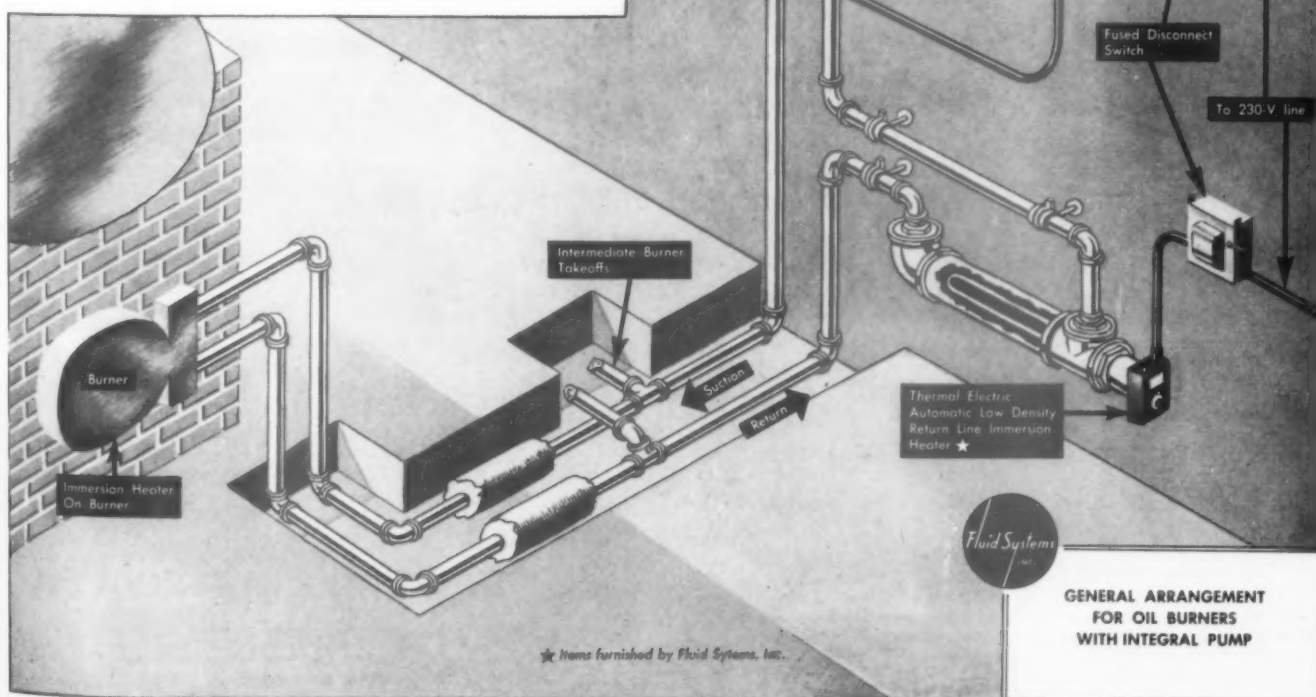
The THERMAL ELECTRIC Method of fuel handling has achieved completely successful results in hundreds of installations. The Method is simplicity itself: low voltage current is passed through the pipe walls used to convey viscous fluids such as Bunker oil. Heat is generated at 100% efficiency by the resistance of the pipe to the passage of the current.

The general layout on this page shows the extreme simplicity of all-electric operation with THERMAL ELECTRIC. The first economy comes from the elimination of cumbersome equipment and complex arrangements. Operating economies multiply the savings. Completely automatic operation is guaranteed with any make of burner.

Complete details of THERMAL ELECTRIC operation and lists of users have been published and are available without cost under the following titles: "The Common Sense of Heavy Fuel Transport"; "The Figures That Prove Thermal Electric Costs Less"; "Thermal Electric Customer List"; "Suggested Specifications for Thermal Electric Installation." Address your request to

**FLUID SYSTEMS, INC.**

P.O. Box 1415 • New Haven 6, Conn.



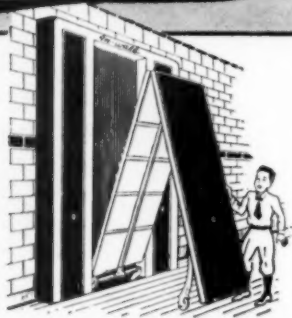
# SCHIEBER MANUFACTURING COMPANY

12734 Burt Road, Detroit 23, Mich.

SCHIEBER  
*In-wall*

**FOLDING TABLE AND BENCH UNITS CREATE SPACE IN EXISTING BUILDINGS**

Against-wall  
for existing  
buildings.



This is the modern way to deal with the problem of increased enrollments. Schieber *In-Wall* units release your present lunch room area for other uses. Against-the-wall units anchored to the face of wall protrude only 7 inches, are neatly trimmed and require no building remodeling.

## ★ SEAT STUDENTS IN 1/3 LESS SPACE

200 students can be seated in 1325 square feet without crowding as compared with 2000 feet necessary with conventional tables and chairs.

## ★ BETTER DISCIPLINE

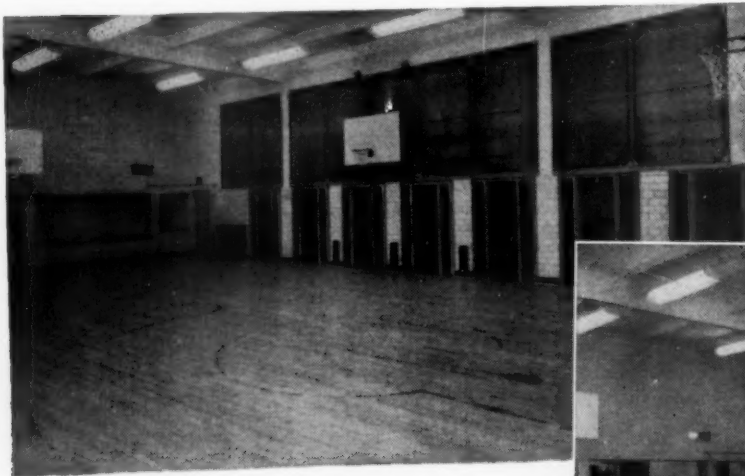
Eliminate the noise of sliding chairs, confusion and disorderly arrangement.

## ★ SERVE MANY USES

By leaving table up the benches serve for student assembly with everyone facing one end of the room. Tables alone can be used for displaying student handicraft projects, etc.

## ★ SAVE TIME AND STORAGE SPACE

Clearing the conventional lunch room of tables and chairs involves many times the labor as well as storable space.



Rolls without lifting on rubber casters with oil-less bronze bearings.

More than 85% of leading school architects specify In-Wall equipment.

**8 MINUTES!**  
GYMNASIUM  
TO  
LUNCH ROOM



ANN ARBOR TRAIL SCHOOL  
DETROIT, MICHIGAN

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# SCHIEBER MANUFACTURING COMPANY

12734 Burt Road, Detroit 23, Mich.

**SCHIEBER**  
*In-wall*

**UNITS REDUCE SQUARE  
FOOTAGE IN CONSTRUCTION\***



In-Wall for new construction.

From coast to coast gymnasiums are serving double duty as lunch rooms. In-the-Wall installations fit flush with the wall, give a streamlined appearance to the entire room, eliminate the need for special lunch room area, and save storage space necessary with conventional tables and chairs.

## ★ EASIER CLEAN UP

After units have been returned to the wall the floor is clear for sweeping, mopping, and waxing. New mark-proof casters leave no streaks on floors.

## ★ RUGGED, LONG-LIFE CONSTRUCTION

There has never been a service call on one of these installations. The first installation, now 10 years old, is in daily use and from all indications "good as new."

## ★ TAMPER-PROOF, FIRE-PROOF

Both tables and benches lock in the pocket and can be taken down only with the knowledge of the person holding the key. The construction is all metal.

## ★ SIMPLIFIED INSTALLATION

Schieber In-Wall table and bench units are shipped complete, ready for installation under factory supervision at no extra cost.

\* Completely patented.

**COUNTERBALANCED  
EASY OPERATION**

## **SCHIEBER** *In-wall* Folding Tables and Benches

### UNITS CONSIST OF:

- 1—Welded steel wall pocket—7" deep x 7' 4" high x 4' 10" wide
- 2—Steel table with cemented battleship linoleum top and stainless steel edges—2' 6" high x 2' 4" wide x 14" long
- 3—Steel benches with cemented battleship linoleum tops, stainless steel edges—1' 8" high x 10½" wide x 14' long

Our consulting and engineering staff will be pleased to make surveys, suggestions and layouts to help you with your lunch room problems.

Write for our new catalog No. 50.



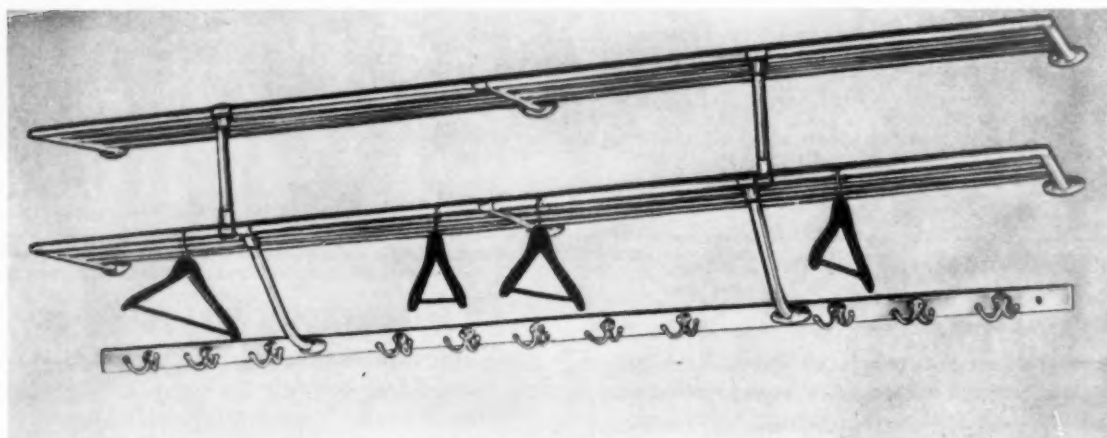


## A. R. NELSON COMPANY, INC.

210 East 40th Street

New York 16, N. Y.

### ARNCO ALUMINUM CLASSROOM CLOTHING RACK AND SHELF FOR SCHOOLS, HOSPITALS, INSTITUTIONS—CLASSROOMS, WARDROBES, COATROOMS



#### UTILITY AT LOW COST:

Here is a smart, new, space-saving and sanitary way of caring for clothing . . . a modern, practical coat and hat rack and shelf which is low in price, making installation inexpensive.

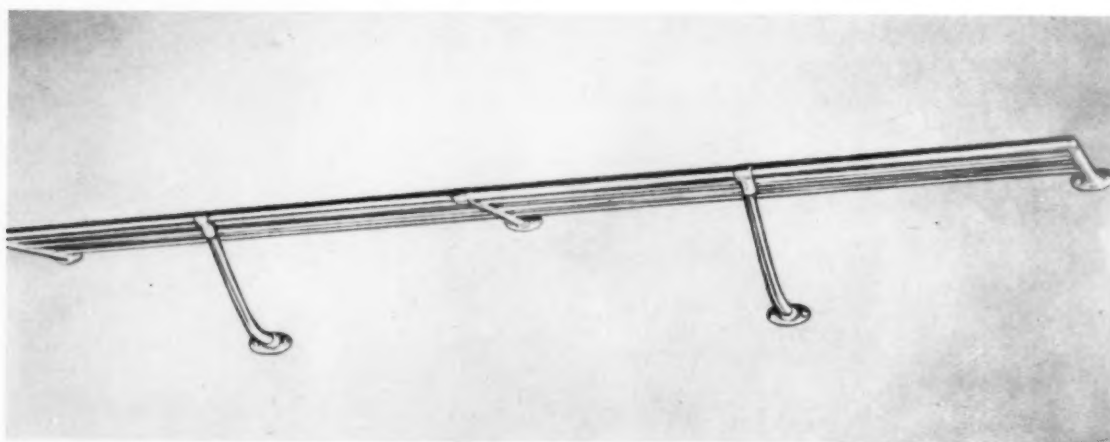
#### STANDARD CONSTRUCTION:

A new and advanced type of wardrobe rack, the ARNCO is made of sturdy, lifetime, seamless aluminum tubing with the non-peeling aluminite finish. Either rack or shelf is available in any desired length—12" deep.

Hook strip of clothing rack is of extruded aluminum. Single or double prong aluminum hook is optional.

#### SANITARY—SPACE SAVING:

Ends storing of food, old clothing, etc., in lockers. And, since all parts are open to air and light, damp clothing will not sour, but dries quickly. Saves space by providing accommodations for 3 persons per square foot. Smart and modern in appearance . . . permanently beautiful.



UTILITY SHELF — Used for Various Purposes in Rest Rooms, Classrooms, Etc.

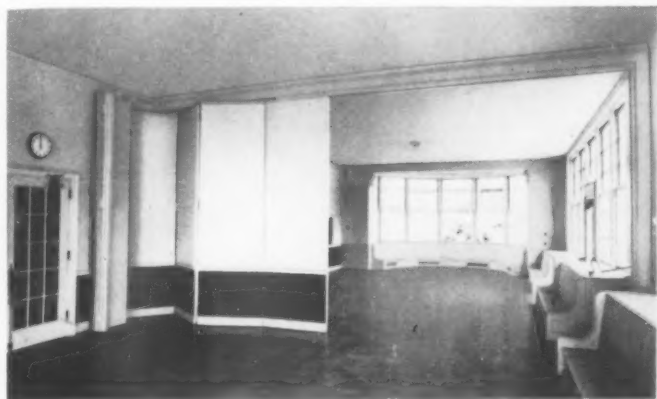
# RICHARDS-WILCOX MFG. COMPANY

1880—

Aurora, Illinois

—1950

BRANCHES: Atlanta • Boston • Chicago • Cincinnati • Cleveland • Des Moines • Detroit • Indianapolis • Kansas City • Los Angeles • Minneapolis  
New Orleans • New York • Denver • Philadelphia • Pittsburgh • St. Louis • San Francisco • Seattle • Washington



Manually Operated Sound-Retarding "FoldeR-Way" Partition  
for Classrooms



R-W No. 780 Wood Receding Door Wardrobe  
(Steel units also available)

## R-W SCHOOL PRODUCTS

### GYMNASIUM FOLDING PARTITIONS

Originator of the DeLuxe fully automatic electric sound-retarding partition, the Richards-Wilcox Mfg. Co., now offers a complete line of automatic partitions for installation in gymnasiums or other large openings. R-W Automatic Partitions are 100% electric, require no manual work, and include this unqualified guarantee—you turn the Switch Key—R-W Does the Rest.

WRITE FOR CATALOG A-89

### CLASSROOM FOLDING PARTITIONS

Schools are being built today to accommodate more pupils and provide greater utility thru the use of R-W Manually Operated Sound-Retarding Partitions. R-W FoldeR-Way Partitions enable adjacent rooms to serve a triple purpose by providing complete room flexibility.

WRITE FOR CIRCULAR F-135 AND CATALOG A-89

### NO. 780 RECEDING DOOR WARDROBES

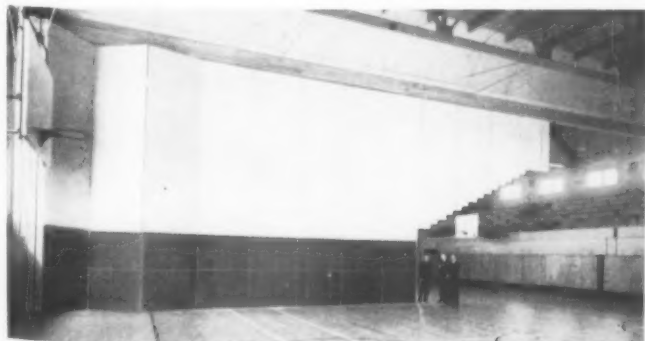
This R-W Wardrobe provides for individual operation of all pupils' doors and permits them to recede entirely into the recess. Thru the use of the offset top and bottom pivots joined together into a single unit by a steel connecting shaft, this wardrobe equipment becomes the heaviest, sturdiest, and most rigid unit ever produced.

WRITE FOR CIRCULAR F-121

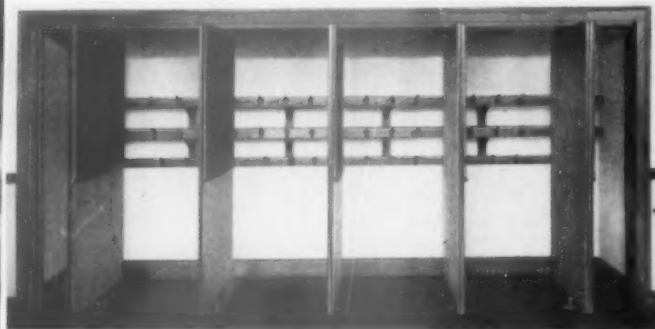
### NO. 883 MULTIPLE OPERATION WARDROBES

Each wardrobe is provided with a master door latch and multiple control mechanism to permit multiple operation of the pupils wardrobe doors. A standard design is available for all classroom widths. Doors recede within  $\frac{1}{2}$ " of the hat and coat rack.

WRITE FOR CIRCULAR F-122



R-W DeLuxe Fully Automatic Electric "FoldeR-Way"  
Partition for Gymnasium Installations



R-W No. 883 Wood Multiple Operation Wardrobe  
(Steel units also available)

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# THE STANLEY WORKS

New Britain, Conn.

## HARDWARE FOR SCHOOL WARDROBES

**STANLEY**

Reg. U.S. Pat. Off.

2705 B1—For Single Doors

2705 B2—For Double Doors

With 1¼-in. clearance between door stiles and floor, and bottom rail cut out between stiles to make 4⅞-in. clearance for ventilation.

2705 C1—For Single Doors

2705 C2—For Double Doors

With 4⅞-in. clearance between door and floor for ventilation.

Stanley offers complete, practical hardware for equipping doors from 18 to 48 in. in width, and any height, with a minimum depth of 25 in. from outside face of door to plaster wall. Two-foot doors project only 2 in. beyond front end of wardrobe when open, which does not hinder passage of pupils. Special hardware can be furnished for wardrobes having minimum

depths to 18 in., but in such cases, two-foot doors will project up to 8 in. into the passage way.

### OPERATION

Doors are hung in pairs, with single doors at the ends if desired. Pairs of doors operate in unison. It is necessary to pull only one door, to open or close both doors.

### INSTALLATION

No mullions or partitions are necessary. Made to set the doors from 1¼ to 4 in. above floor. Special clearances on order. It is preferable to set the doors up from the floor to provide ventilation. The maximum space taken up in the wardrobe is 5 in. for two 1½-in. doors.

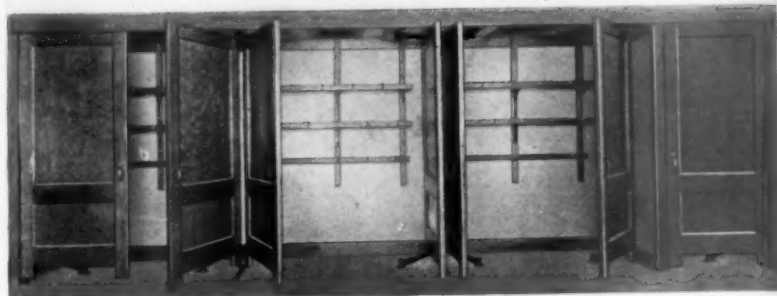
### SECTIONS

The number of sections that can be had in a unit is unlimited. Three four-foot sections are usually sufficient for the average classroom, as each section provides for seventeen pupils. A single two-foot section on either end provides the teacher's locker.

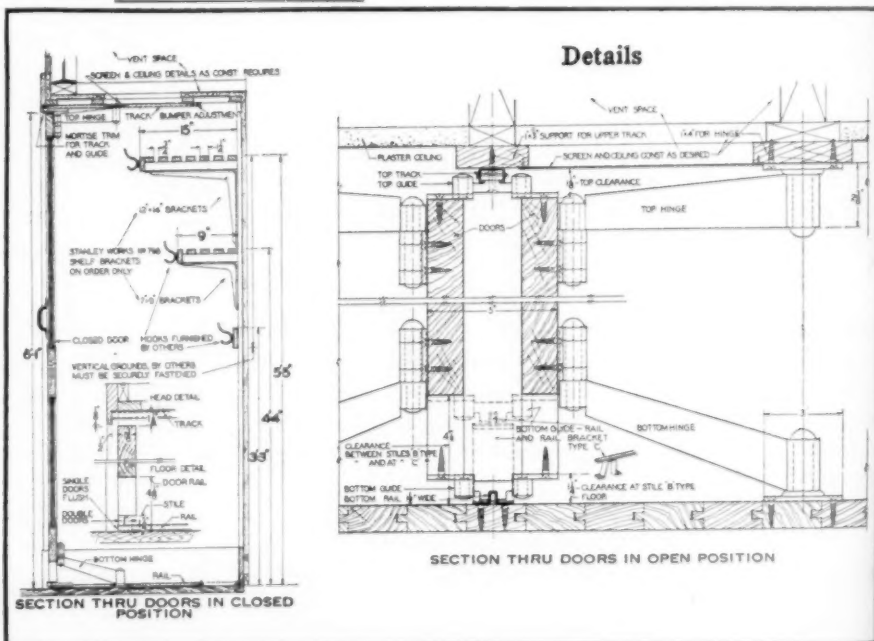
### HARDWARE

The extra heavy steel hinges will carry over 300 lbs. The hinge arms are 8¾ in. long, ¼ in. in thickness and set well back to avoid any tripping hazard. The pins are grooved for lubricant.

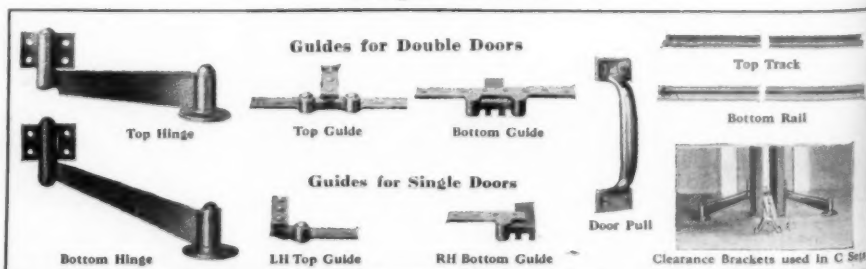
The top track and bottom rail are made of wrought steel; the guides are bronze. The bronze-on-steel bearing surface minimizes wear and insures smooth noiseless operation. Track and rail do not in any way hang or support the doors; they guide them. There is sufficient friction to prevent the doors from slamming. The track is fitted with rubber bumpers to insure quiet operation.



A Typical Installation



### Component Parts



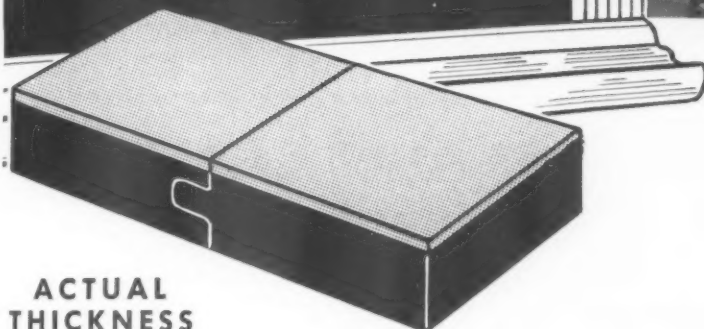


# CLARIDGE PRODUCTS, INC.

6729 N. Olmsted Avenue, Chicago 31, Ill.

## DURON Clearcite-Green

Relieves Eyestrain  
Improves Classroom Lighting  
Durable Beyond Belief



ACTUAL  
THICKNESS

### TONGUE and GROOVE JOINT

*Most Modern Way of Joining Chalkboards*

Here for any classroom is new permanent beauty and color harmony and a great improvement in the over all light pattern. The soft, cool, restful Clearcite green has only

19% light reflection which is considered almost perfect by lighting engineers. Clearcite green reduces eyestrain to the minimum and you enjoy peak seeing ease in normal light. Here are superior performance and new efficiency in a major teaching tool . . . the class blackboard.

## DURON Chalkboard

*With NEW Tongue and Groove Joint*

Thicker, stronger more rigid panels. Harder, more durable Silicon Carbide writing surface. New color harmony. These features make Duron the Stand-out among today's chalkboards. It is dent-proof, crack proof, non-breakable, color fast, in fact virtually indestructible. There is no finer, more serviceable chalkboard available.

## GRAPHOLITE

Low cost dependability. Hydro-pressed panel. Hard, smooth surface—trouble free writing qualities. Gives utmost satisfaction.

## FABRICORK Bulletin Boards

No finer background for posting announcements. Holds tacks and pins securely. Remains pliable indefinitely. Adds life and brightness to the classroom.

## STRUCTOPLATE

Writing stands out minimizing eye strain. Waterproof surface. Base of dense panels made of shredded hardwood with a tensile strength of more than 2500 lbs. per square inch. Adaptable anywhere.

## Aluminum TRIM... Beautiful, Modern

Available in screw-on or snap-on type for wood or metal grounds. Entirely metal—fireproof. More than a group of simple mouldings, includes troughs, map rails, clips, springs . . . a complete matched family! Fluted design. Beautiful brush-satin finish.

# CLARIDGE PRODUCTS, Inc.

6729 N. Olmsted Avenue, Chicago 31, Ill.

WRITE FOR DETAILS . . . without cost or obligation, receive Samples, Architectural Details and Specifications on Chalkboard, Bulletin Board and Extruded Aluminum Trim. Send NOW!

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

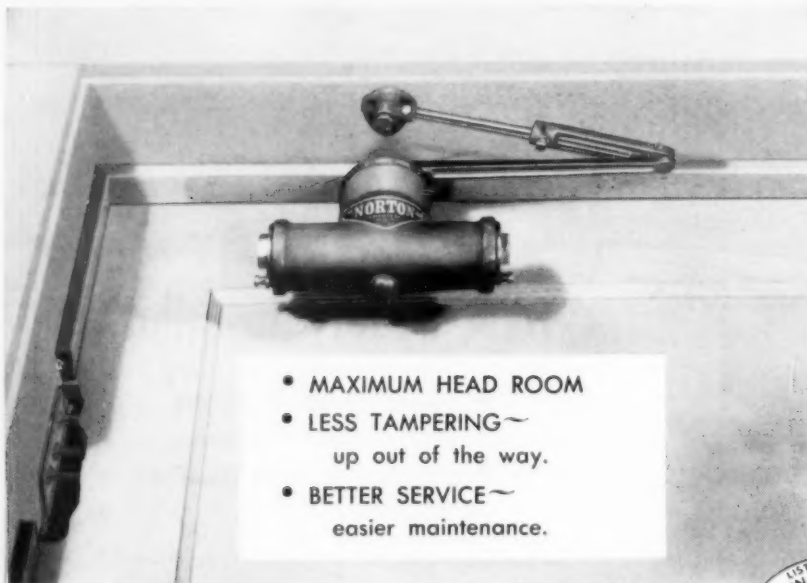


## NORTON DOOR CLOSER CO.

Division of The Yale & Towne Mfg. Co.

2900 N. Western Ave., Chicago 18, Ill.

NORTON DOOR CLOSERS MEET FEDERAL SPECIFICATIONS F.F.-H-121a



- MAXIMUM HEAD ROOM
- LESS TAMPERING—  
up out of the way.
- BETTER SERVICE—  
easier maintenance.

### NORTON PARALLEL ARM CLOSERS FOR SCHOOLS

The Norton 90° to 180° Parallel Arm Closer was designed for building detail where low headroom does not permit conventional installation. It is ideal for school use because it eliminates the need for brackets, hence permits maximum head room. It is well out of the way and minimizes handling and tampering. The new Norton Aluminum Shell surface closer has established a record for low-cost maintenance. Five different sizes provide for the lightest to the heaviest types of doors.

For new buildings Norton has perfected a *concealed* closer, the last word in door checking technique. Every Norton Closer carries a 2-year factory guarantee.

### ONLY NORTON HAS ALL OF THESE FEATURES

- **ALUMINUM SHELL**—A new and exclusive feature that has established the best "no-service needed" record in our 70 years of making closers.
- **RACK AND PINION**—Guarantees positive control at every point. Easy regulation of closing speed.
- **LEAKPROOF SHAFT AND PACKING NUT**—Equipped with a special synthetic rubber material impervious to oil and other agents.
- **OIL-IMPREGNATED BOTTOM BEARING**—self-lubricating, inserted by force in bottom of shell. Insures dependable, sure action.
- **ANTI-FREEZE OIL CHECKING FLUID**—non-gumming and non-freezing. Provides maximum operating efficiency.
- **SPECIAL STEEL SPRING**—Motor clock-type. Performance-proved by 50 years of use in Norton surface door closers.
- **FOUR TYPES OF ARMS AND 9 BRACKET STYLES**—to take care of virtually every need.
- **TWO SPEEDS OF REGULATION**—on one regulating screw permits easy adjustment for slow or fast closing.

WRITE FOR CATALOGUE

**"THERE'S NOTHING LIKE A NORTON!"**

70 YEARS OF LEADERSHIP IN DOOR CLOSERS

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

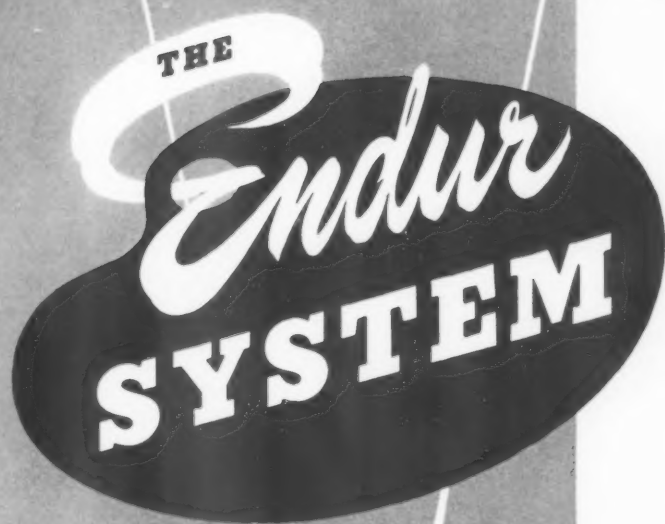


### NORTON FUSIBLE LINK ARM

The Fusible Link Arm, a variation of the regular Norton holder arm, is noted for its simplicity in design and sureness of action as a fire-protection measure. It is approved by the National Board of Fire Underwriters. Norton surface closers are also approved by the Bureau of Standards for Government work under Federal Specifications F.F.-H-121a.



FIRST NAME IN DOOR CLOSERS



*for SIMPLIFIED  
scientific interior  
decoration of  
modern  
CO-ORDINATED  
classrooms*

**REFLECTANCE  
CONTROLLED  
PAINT  
PRODUCTS FOR...**

**CHALKBOARDS**

**WALLS**

**CEILINGS**

**DADOES**

**CABINETS**

**FLOORS**

**WOODWORK  
AND TRIM**

**FUNCTIONAL PAINTING** *an aid to Education...*



# THE *Endur* SYSTEM



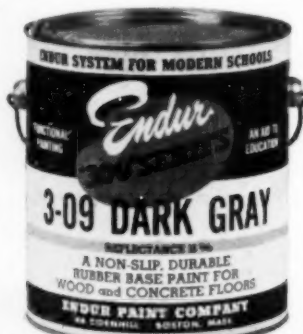
**CHALKBOARD  
RESURFACER**

## SECTION 1



**INTERIOR  
FINISHES**

## SECTION 2



**FLOOR  
PAINTS**

## SECTION 3

The ENDUR SYSTEM presents a series of finishes in colors with carefully controlled reflectance values. By using the ENDUR SYSTEM COLOR CHART (Page 7), even the totally inexperienced will have little difficulty in selecting scientifically correct color schemes for the interior decoration of modern, coordinated classrooms.

In many of our old schools, outmoded classroom interiors present an extremely serious problem. Black chalkboards, dark wall, woodwork, floor and furniture finishes absorb much of the already inadequate artificial light; natural light is uncontrolled and glaring; and brightness contrasts are harsh and unfavorable. Each of these factors contributes to an unsatisfactory visual environment that is highly detrimental to student eyesight, health and morale.

Lighting engineers, after years of research, have succeeded in correcting this situation by specifying green chalkboards; controlled natural and artificial light; natural wood furniture finishes; and interior decoration with low contrast, properly light reflectant pastel colors. Each of these is carefully co-ordinated with the others to assure evenly distributed, glare-free light without undesirable brightness contrasts. For this reason, major capital investments for seating and lighting give maximum returns only when surrounded by proper interior decoration.

The Endur System is offered to simplify the problem of selecting scientifically correct color schemes for the interior decoration of brightness-balanced classrooms in old schools or in new school construction. All products of this system have been specially developed for school use, and present colors with light reflectance values that assure proper brightness balance (within the 3:1 helios ratio range) when used as recommended on the ENDUR SYSTEM COLOR CHART (Page 7).

All products of the Endur System are available through your school supplier. He is completely familiar with school problems, and will be glad to help in every way he can to further your plans for better schools.

**ENDUR PAINT COMPANY 46 CORNHILL • BOSTON 8, MASS.**

## COMPLETELY RESURFACE OLD, WORN SLATE OR COMPOSITION CHALKBOARDS

**Endur**  
"200" SERIES  
GREEN CHALKBOARD  
RESURFACER

• ONLY 3c PER SQUARE FOOT FOR MATERIALS

Give them new, smooth surfaces  
in reflectance-controlled green



### SIMPLE APPLICATION — DURABLE — ECONOMICAL

Readily applied by brush or spray gun, ENDUR "200" SERIES GREEN Chalkboard Resurfacer makes completely new surfaces on which it is easy to write clearly and erase cleanly. Equally effective on slate or composition chalkboards, it has been successfully applied to worn, pitted slate boards over 40 years old. ENDUR "200" SERIES surfaces are extremely durable and have been proved by actual use and research laboratory tests to successfully withstand from 5 to 10 years of normal classroom wear. Material cost for complete three coat application amounts to only 3c per square foot.

### SCIENTIFIC COLOR REDUCES EYE-STRAIN

ENDUR "200" SERIES surfaces are the exact chroma and value of green recommended by modern lighting engineers. By providing maximum light reflectance value in combination with extreme visibility, these fresh, new ENDUR "200" SERIES chalkboard surfaces play a major part in furnishing a satisfactory visual environment for students and teachers.

### Available in two shades of Green

ENDUR "200" SERIES GREEN Chalkboard Resurfacer is available in Standard ENDUR 2-24 GREEN for average classrooms; or in Special ENDUR 2-20 GREEN (a darker shade with slightly lower light reflectance value) for extra large classrooms or where there is an overabundance of natural light.



### ESSENTIAL TO BRIGHTNESS-BALANCE

ENDUR "200" SERIES surfaces harmonize perfectly with the light pastel colors recommended for modern brightness-balanced classrooms as demonstrated on the ENDUR SYSTEM COLOR CHART.

### KEEP CHALKBOARDS SMOOTH

Once boards have been resurfaced it is simple and economical to keep them smooth and unscarred by applying a single coat of ENDUR "200" SERIES whenever they show signs of wear.

**NEW SCHOOL  
CONSTRUCTION**

AVAILABLE FROM YOUR SCHOOL SUPPLIER —  
ENDUR CHALKBOARDS made from industrial  
tempered Hardboard to which smooth, durable  
ENDUR "200" SERIES surfaces have been  
factory applied.

**SEE SECTION 1 • PAGE 8,  
for detailed specifications**

# Endur

## "500" SERIES

WALL, CEILING AND  
WOODWORK FINISHES



### CONTROLLED BRIGHTNESS CONTRASTS FOR *Modern* CO-ORDINATED CLASSROOMS



The ENDUR "500" SERIES consists of an odorless, 20 minute drying, emulsified rubber base paint that produces a smooth, flat, washable finish (free of brush or lap marks) on virtually any surface to which it is applied. It is available in 14 colors and white, which, when used as recommended on the ENDUR SYSTEM COLOR CHART, present proper reflectance values for use in the interior decoration of modern, co-ordinated classrooms.

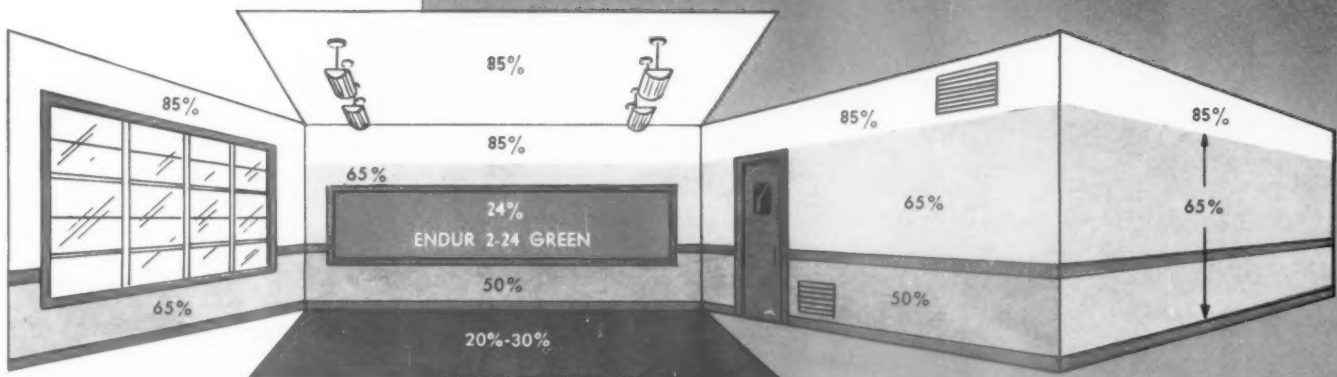
The special rubber base with which this paint is made assures surfaces that are very easy to clean while it keeps reflectance values constant despite washing, aging and exposure to strong sunlight. Thus, ENDUR "500" SERIES paint keeps classrooms brightness-balanced indefinitely.

ENDUR "500" SERIES paint is amazingly easy to use. It spreads freely — actually takes about half as long to apply as do ordinary oil base paints — and only one coat is generally sufficient to seal, prime and finish almost any surface. Because there is nothing in the paint that can saponify, no special neutralizer or primer is necessary before use on concrete or plaster.

#### NO FIRE HAZARD

ENDUR "500" SERIES paint is reported in the Boston Fire Department Fire Prevention Division Testing Laboratory Report No. 8814 as follows: "Endur Beige Rubber Emulsion Paint no fire hazard." The transmittal letter with the above form and from the same source says in part: "... Endur '5-15' Series is not fire hazardous ..." As formulation of the paint remains constant despite changes in pigments to produce different colors, this report actually covers all ENDUR "500" SERIES paint.





To permit quick recognition and to prevent mistakes, the label on each can of ENDUR SYSTEM products clearly identifies the contents by reflectance value and recommended use.

## General RECOMMENDATIONS

Careful consideration should be given selection of color schemes. Colors that harmonize poorly will not provide a proper visual environment, even though light reflectance values may be correct.

- **ROOMS WITH A SOUTH OR WEST EXPOSURE** receive the most sunlight, consequently their walls should be painted in "cool" colors — green, gray, or blue.
- **ROOMS WITH A NORTH OR EAST EXPOSURE** receive less sunlight so their walls should be painted in "warm" colors — yellow, turquoise or beige.
- **CEILINGS** should be painted white in order to assure the greatest possible distribution of light. The ceiling white should extend down the walls to the level of the light fixtures, or to within approximately ten feet of the floor.
- **BACK WALLS** may be painted in a solid wall tint with dado omitted.
- **WINDOW SIDE OF ROOM** may be painted white down to the dado area, which may be painted the same color as the front wall.
- **CORRIDORS AND STAIRWAYS** may be painted yellow.

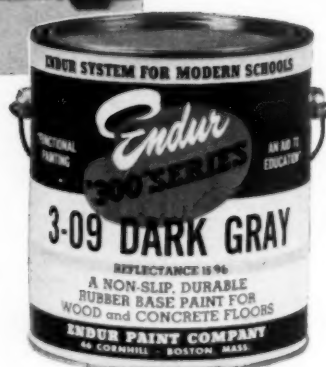
*See Section 2...* PAGE 8, for detailed specifications



FOR WOOD  
OR  
CONCRETE



**ENDUR "300" SERIES NON-SLIP FLOOR PAINT** has been specially developed to give safe, durable, easily maintained floor surfaces in schools and industries.



#### SAFE, SLIP-PROOF SURFACES

ENDUR "300" SERIES NON-SLIP FLOOR PAINT contains minute particles of silicon carbide ("carborundum") and aluminum oxide. These particles, which are uniformly suspended throughout the paint by means of a special process, help bond paint to the floor while furnishing virtually slip-proof surfaces.

#### FOR WOOD OR CONCRETE

The rubber base of ENDUR "300" SERIES paint is non-oxidizing. Therefore, pigments in this paint remain tightly bonded to the surface long after those in ordinary, readily oxidizing, oil base paints become dry and are scuffed or scrubbed from the floor.

This rubber base is also non-saponifying and is not affected by the action of chemicals in concrete.

ENDUR "300" SERIES NON-SLIP FLOOR PAINT is suitable for use on virtually any type of floor surface. It does not chip, blister or peel, but wears evenly to eliminate any need for costly sanding or scraping when repainting becomes necessary.

#### SANITARY AND EASY TO CLEAN

The special rubber base in ENDUR "300" SERIES paint resists water, wear, oils, greases, chemicals, alkalis, etc. It tightly seals porous concrete surfaces — prevents absorption of unsightly stains or unpleasant odors — stops dusting caused by heavy traffic — keeps shower and locker room floors from harboring germs of athletes' foot and other contagious skin diseases — and is specially recommended for use on floors of kitchens, cafeterias, lavatories, shower rooms, or wherever unusual conditions defeat ordinary floor paint. Despite its abrasive surface, ENDUR "300" SERIES NON-SLIP FLOOR PAINT has a slight gloss finish that is very easy to clean, and does not pick up lint from mops or other cleaning tools.

## SECTION 3

SEE SECTION 3,  
PAGE 8,  
for detailed  
specifications

## GENERAL USES

Use light colors for: Classrooms, kitchens, cafeterias, shower and locker rooms, hallways, stairways, lavatories, auditoriums, recreation halls, etc.

Use darker colors for: Identifying fire equipment, play and other areas; marking floor patterns for games; traffic guide lines and directional arrows; etc.

## SECTION 1

### ENDUR "200" SERIES GREEN

#### CHALKBOARD RESURFACER

Available in Standard ENDUR 2-24 GREEN for average classrooms; or in Special ENDUR 2-20 GREEN (a darker shade with slightly lower light reflectance value) for extra large classrooms or where there is an over-abundance of natural light.



2-24 GREEN  
REFLECTANCE 24%



2-20 GREEN  
REFLECTANCE 20%



# COLOR CHART

FOR THE ENDUR "500" SERIES OF CEILING, WALL, DADO  
AND WOODWORK PAINT • ENDUR "300" SERIES NON-  
SLIP FLOOR PAINT • ENDUR "200" SERIES GREEN  
CHALKBOARD RESURFACER

NOTE: Because of the difference between printer's ink and paint these colors may vary slightly from those of the actual product. Floor paint swatches show color only, not actual texture.

#### DADOES — Reflectance 50%



5-31 PEACH



5-33 SKY BLUE



5-35 GRAY GREEN



5-53 SMOKE GRAY



5-55 DOVE GRAY

## SECTION 2

### ENDUR "500" SERIES

Correlated Colors for Modern Classrooms

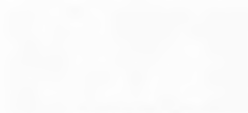
**CEILINGS** — Reflectance 85%

USE ENDUR 500 FLAT WHITE

**WALLS** — South or West Exposure — Reflectance 65%



5-01 SUN TAN



5-03 IVORY



5-05 SILVER GRAY



5-07 EMERALD GREEN



5-09 BLUE GRAY

**WALLS** — North or East Exposure  
Reflectance 65%



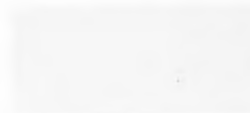
5-11 LEMON YELLOW



5-13 TURQUOISE



5-15 BEIGE



5-17 CREAM

#### WOODWORK

Reflectance 45%

## SECTION 3

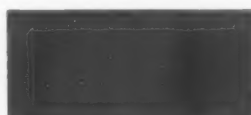
### FLOORS ENDUR "300" SERIES NON-SLIP FLOOR PAINT



3-01 GREEN  
REFLECTANCE 15%



3-03 DARK RED  
REFLECTANCE 8%



3-05 DARK BLUE  
REFLECTANCE 6%



3-07 LIGHT GRAY  
REFLECTANCE 25%



3-09 DARK GRAY  
REFLECTANCE 15%



# SECTION

# SPECIFICATIONS

1

## ENDUR "200" SERIES

**PREPARE SURFACE:** Board should be carefully cleaned of all foreign matter, washed with turpentine and allowed to dry.

**MIX RESURFACER THOROUGHLY:** Use flat paddle to stir. Pour half the contents into another container and stir both halves vigorously. Continue stirring while returning first half to original container.

**APPLICATION:** Use good quality, soft, long-bristle brush (or spray gun). Paint with side to side stroke and brush out well to avoid sagging. Average boards will require three coats; old, pitted boards four coats. Each coat should dry at least 24 hours before the next is applied. If contents become too thick during application, thin by mixing in well just enough turpentine to permit free brushing.

**SMOOTHING:** Allow final coat to dry for 48 hours. Sand moderately using water with Waterproof Garnet Paper (Grit

#4/0) or Tri-Mite Paper, Grit #280-A, Soft Back. Sanding machine of oscillator or vibrator type with flexible backing may be used. Sand small area at a time and sponge clean before proceeding.

**CHALKING IN:** When surface is dry after sanding, wipe it over with a clean, dry cloth. Chalk surface with flat side of a piece of white chalk. Remove chalk dust with eraser or clean, dry cloth.

**USING SURFACE:** For best results, and longest possible use of ENDUR "200" SERIES surfaces, it is recommended that Dustless, soft, white chalk be used.

**COVERAGE:** About 250 square feet per gallon for complete, three coat application.

**MATERIAL COST:** Approximately 3¢ per square foot.

# SECTION

2

## ENDUR "500" SERIES

**PREPARE SURFACE:** Make sure surface is absolutely clean and dry. Remove all loose scale, sizing, calcimine and water soluble casein paint. Wash with alkaline cleanser to remove oil and grease. Glossy surfaces should be dulled with steel wool.

**MIX PAINT THOROUGHLY:** Stir well, but do not shake or agitate excessively.

**APPLICATION:** May be applied with spray gun or large (up to 7") soft bristle or nylon brush. Keep brush full and do not brush out excessively. Smooth with tip of brush.

**ON OLD WORK:** Apply paint just as it comes from the can.

**ON NEW WORK:** Apply as on old work, except that on extremely porous surfaces paint may be thinned slightly with water. If necessary, after a 12 hour drying period, second coat may be applied full strength.

**CONCRETE, PLASTER AND MASONRY SURFACES:** No neutralizer or special undercoat necessary. There is nothing in this paint to saponify.

**WOOD, WALLBOARD, ETC.:** One coat seals, primes and finishes.

**METAL:** Apply chromate primer to clean, dry surface. Follow when dry with one coat of ENDUR "500" SERIES.

**GENERAL:** This paint dries to touch in twenty minutes, but should be permitted to cure for thirty days before washing. Paint should be thinned only with water. Do not attempt to use turpentine or other paint solvents. Immediately after use, brushes and equipment should be cleaned with warm, soapy water. Do not permit paint to freeze.

**COVERAGE:** 400 to 500 square feet per gallon.

**MATERIAL COST:** Approximately 1¢ per square foot.

# SECTION

3

## ENDUR "300" SERIES

**MIX PAINT THOROUGHLY:** Transfer half the contents of the can to another container. Stir each half thoroughly and continue stirring while pouring first half back into original container. Abrasive particles settle after standing, like pigments in ordinary paint, but return to uniform suspension with moderate stirring.

### APPLY WITH BRUSH OR SPRAY GUN

**WOOD SURFACES:** Surface should be as clean and dry as possible. Remove all old paint that is peeling or cracking. Remove oil and grease with an alkaline cleanser. Rinse well with clear water. Allow floor to dry thoroughly before applying first coat thinned with 10% pure turpentine. Apply second coat full strength allowing 24 hours drying time between coats.

**CONCRETE SURFACES:** Surface should be as clean and dry as possible. Remove all old paint that shows evidence of

failure. Remove grease and oil as recommended under "Wood Surfaces". Glazed, or extremely smooth surfaces should be etched with Sani-Flush. Sprinkle on wet floor directly from can, then scrub with long handled brush or broom. Rinse well with clear water. Allow floor to dry thoroughly before applying first coat thinned 10% with pure turpentine. Second, full strength coat may be applied 24 hours later.

**ON METAL:** Surface should be as clean and dry as possible. Clean corroded metal thoroughly with wire brush or by chipping. Apply chromate primer and finish when dry with one full strength coat of ENDUR "300" SERIES paint.

**NOTE:** All equipment should be thoroughly cleaned with turpentine after using.

**COVERAGE:** About 500 to 600 square feet per gallon.

**MATERIAL COST:** From 2 to 3¢ per square foot.

## THESE SCHOOL SUPPLY DEALERS CARRY ALL ENDUR SYSTEM PRODUCTS

**ALABAMA**  
American Seating Co., Atlanta, Ga.  
John R. Moffitt Co., Inc., Montgomery

**ARIZONA**  
Marston Supply Co., Phoenix

**ARKANSAS**  
All-State Supply Corp., Little Rock

**COLORADO**  
Centennial School Supply Co., Denver

**CONNECTICUT**  
J. L. Hammett Co., Cambridge, Mass.

**DELAWARE**  
American Seating Co., Philadelphia, Pa.

**DISTRICT OF COLUMBIA**  
Flowers School Equipment Co.,  
Richmond, Va.

**FLORIDA**  
American Seating Co., Atlanta, Ga.  
Bowen Supply Co., Plant City

**GEORGIA**  
American Seating Co., Atlanta

**IDAHO**  
Northern School Supply Co.,  
Great Falls, Montana

**ILLINOIS**  
Blackwell-Wielandy Co., St. Louis, Mo.

**INDIANA**  
Modern School Supply, Indianapolis

**KANSAS**  
Hoover Bros., Inc., Kansas City, Mo.  
School Specialty Supply, Salina

**LOUISIANA**  
Rowley Co., Inc., New Orleans

**MAINE**  
J. L. Hammett Co., Cambridge, Mass.

**MARYLAND**  
Flowers School Equipment Co.,  
Richmond, Va.

**MASSACHUSETTS**  
J. L. Hammett Company, Cambridge

**MICHIGAN**  
Michigan School Services, Inc., Lansing

**MINNESOTA**  
St. Paul Book & Stationery Co., St. Paul

**MISSISSIPPI**  
Lawrence-Allen School Supply,  
Greenwood

**MISSOURI**  
Hoover Bros., Inc., Kansas City  
Blackwell-Wielandy Co., St. Louis

**MONTANA**  
Northern School Supply Co.,  
Great Falls

**NEBRASKA**  
Hoover Bros., Inc., Kansas City, Mo.

**NEW HAMPSHIRE**  
J. L. Hammett Co., Cambridge, Mass.

**NEW JERSEY**  
American Seating Co., Philadelphia, Pa.  
J. L. Hammett Company, Newark

**NEW YORK**  
American Seating Co., Syracuse  
Long Island Institutional Equipment  
Co., Inc., Mineola, L. I.

**NORTH CAROLINA**  
Southern School Supply, Raleigh

**NORTH DAKOTA**  
Northern School Supply Co., Fargo

**OHIO**  
The Dobson-Evans Co., Columbus

**OREGON**  
Northern School Supply Co., Portland

**PENNSYLVANIA**  
American Seating Co., Philadelphia

**RHODE ISLAND**  
J. L. Hammett Co., Cambridge, Mass.

**SOUTH CAROLINA**  
American Seating Co., Atlanta, Ga.

**SOUTH DAKOTA**  
Sioux Falls Book & Stationery Co.,  
Sioux Falls

**TENNESSEE**  
Athens Equipment Co., Athens

**TEXAS**  
Hoover Bros., Inc., Temple  
Texas School Supply Co., San Antonio

**VERMONT**  
J. L. Hammett Co., Cambridge, Mass.

**VIRGINIA**  
Flowers School Equipment Co., Richmond

**WASHINGTON**  
Northern School Supply Co., Seattle

**WEST VIRGINIA**  
Kyle & Company, Clarkburg

**WISCONSIN**  
Eau Claire Book & Stationery Co.

**WYOMING**  
Northern School Supply Co.,  
Great Falls, Montana

Two

**NEW**

## **FINER ACOUSTICAL PRODUCTS**

Presented by Dant & Russell Sales Co.

**1**

**FIR-TEX PERFORATED TILE**

**2**

**DANTORE INCOMBUSTIBLE TILE**

To Serve Every Type of Sound Problem

**DANT & RUSSELL  
SALES CO.**

General Offices:  
7th Floor, Equitable Bldg.  
PORTLAND 5, OREGON

Sales Offices:  
8 S. Michigan Avenue  
CHICAGO 3, ILLINOIS





# FIR-TEX

## PERFORATED ACOUSTICAL TILE

FIR-TEX Perforated Acoustical Tile is made of strong, tough wood fibers, felted together and pressed into a rigid tile in such a way as to preserve the natural air cells within the fibers and add millions more sound-absorbing cells between fibers. Exposed surface is then perforated in a rectangular pattern. Soaks up noise like a sponge takes water.

**STANDARD SIZES** — 12"x12" and 12"x24" (scored or unscored). Thicknesses: 1/2", 3/4" and 1". Beveled edges, butt joint.

\* Kerfed upon order.

**SOUND ABSORPTION** — FIR-TEX Acoustical Tile is scientifically engineered to absorb reverberations and take the shock or impact out of noise. FIR-TEX Tile is one of the outstanding Acoustical Tiles as shown by the following tests:

Text No.	Material	Mounting	128	256	512	1024	2048	4096	N.R. Co-E.
A-49-110	1/2"x12"x12"	No. 1	.08	.16	.61	.69	.72	.68	.55
A-49-179	1/2"x12"x12"	No. 2	.05	.41	.60	.73	.75	.73	.60
A-49-66	3/4"x12"x12"	No. 1 Cemented to solid backing	.09	.27	.78	.91	.79	.73	.70
A-49-65	3/4"x12"x12"	No. 2 nailed to furring strips	.18	.53	.62	.87	.81	.71	.70
A-49-130	1"x12"x12"	No. 1	.12	.27	.89	.95	.75	.70	.70
A-49-129	1"x12"x12"	No. 2	.20	.46	.84	.97	.78	.67	.75

Approved by the Acoustical Materials Association

**FINISH** — FIR-TEX Perforated Acoustical Tile is factory painted oyster white (two coats). It has a textured finish to insure maximum light diffusion and attractiveness. Meets all federal specifications for washability—may be repainted as often as necessary without materially reducing its sound absorption qualities.

**MOISTURE-RESISTANT** — Its strong, tough fibers have been sterilized and integrally waterproofed. When immersed for two hours at 70° F. only 4.7% of its volume is absorbed. The tile is painted with one coat on the back and two coats on the face and edges, making it highly resistant to moisture and buckling under normal application.

**PROCESSED TO RESIST TERMITES AND FUNGI** — Subjected to the exclusive FIR-TEX process as a protection against termites and dry rot fungi. This protection is permanent and odorless.

**BORDERS** — Border units of the same material without the perforations are available, thus permitting an attractive pattern to be achieved.

**APPLICATION** — FIR-TEX Tile may be applied with standard adhesives or nailed or screwed to wood decks or furring, the nail or screw being countersunk in special perforations provided for that purpose.







## INCOMBUSTIBLE ACOUSTICAL TILE

**DESCRIPTION** — DANTORE Incombustible Tile provides a surface of distinctive beauty and character as well as one possessing high acoustical qualities. DANTORE is definitely incombustible as it is made from minute granular globules of exploded volcanic glass, which also give the tile high sound absorption and insulation. Available in fissured travertined surface. DANTORE Tile is painted oyster white—two coats on the face and one coat on the back to reduce "breathing". It is easy to install with a minimum of cutting waste.

Thickness	Size	Edges	Treatment
$\frac{1\frac{1}{8}}{16}$ "	12" x 12"	Square or bevel edged	Kerfed for splines for adhesive application
$\frac{1\frac{3}{8}}{16}$ "	12" x 12"	Square or bevel edged	Kerfed for splines for adhesive application
$\frac{1\frac{5}{8}}{16}$ "	12" x 12"	Square or bevel edged	Kerfed and rabbeted for mechanical erection
$\frac{1\frac{5}{8}}{16}$ "	12" x 24"	Square or bevel edged	Kerfed and rabbeted for mechanical erection

**PAINTABILITY** — Authoritative tests show that DANTORE Incombustible Acoustical Tile may be spray painted without material loss of sound absorption. A resin emulsion paint is recommended.



Wherever the control of sound is essential—in offices, restaurants, theatres, auditoriums, schools, hospitals and other commercial buildings—one of these two of the better acoustical tiles will be found admirably suited for the job.



**INCOMBUSTIBILITY** — DANTORE Acoustical Tile is incombustible as rated by recognized laboratories following the "Columbia" time temperature curve as outlined in Federal specifications, SSA-118a.

**WEIGHT AND STRENGTH** — It is lightweight and strong. Weighs just one pound per square foot  $\frac{15}{16}$ " thick. This reduces the "pull load" when the tile is applied by the adhesive method.

**COLORS** — Factory painted a light oyster white finish for high light reflecting quality. Produces a luxurious finish for ceilings.

**TEXTURE** — Beautiful range of fissures, no two tiles are identical. Each job, no matter how small, portrays unusual beauty and character. Back-primed to prevent "breathing".

**SPLINED FOR TRUE ALIGNMENT** — All DANTORE Incombustible Acoustical Tile for adhesive application is kerfed on four edges to receive long fibrous splines. For mechanical erection it is kerfed and rabbeted. Thus whichever method of application is used, true alignment and perfect flat seams are assured no matter what roll or sway the original surface may have. It tends to eliminate shadows caused by imperfect matching when ceiling lights play on the surface.

**SOUND ABSORPTION** — New tests on both thickness and mountings of Dantore Acoustical Tile are in process constantly and are available upon request. Typical of the results are the following tests on 15/16" and 13/16" thicknesses.

Test No.	Material	Mounting	128	256	512	1024	2048	4096	Noise
A-49-140	15/16"x12"x12"	No. 2	.14	.34	.86	.89	.79	.77	.70
A-49-44	15/16"x12"x12"	No. 7*	.57	.64	.70	.72	.85	.85	.75
		(See note)							
A-49-40	13/16"x12"x12"	No. 2	.18	.35	.81	.83	.72	.75	.70

\* No. 7 mounting with metal supports mounted on 2" thick wood members 8" high. Back space 8 1/2".

#### INSTALLATION SERVICE ON BOTH FIR-TEX AND DANTORE TILE

Experienced, capable, financially responsible applicator-distributors on an exclusive basis have been appointed in the principal cities throughout the United States and are prepared to give specialized service on both Fir-Tex and Dantore Tile. They are prepared to handle any job of any size and render satisfactory service. Write the Director of Field Operations, Dant & Russell Sales Co., 8 So. Michigan Ave., Chicago 3, Illinois, for full information and name of nearest applicator-distributor. Inquiries from Pacific Coast should be sent to Dant & Russell, Inc., 7th floor Equitable Building, Portland, Oregon.

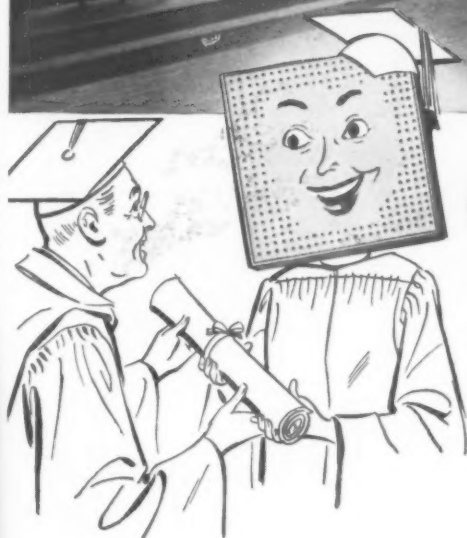
#### DANT & RUSSELL SALES CO.

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CHICAGO 3, ILLINOIS

# THE CELOTEX CORPORATION

Chicago 3, Illinois



## QUIET wins a college degree!

### WITH MODERN SOUND CONDITIONING

Both students and professors know what unchecked noise can do to a lecture, discussion or study period. That's why scores of leading college and university administrators have already ordered modern Sound Conditioning installed in classrooms, libraries, gyms and auditoriums—with cum laude results!

Acousti-Celotex ceiling tile checks sound reverberation before it starts. Assures "front-row hearing" to every student, regardless of how far back he is seated. Teaching is more effective, too, when every word is sure to

be heard distinctly and easily.

Wherever students gather for study, eating or indoor recreation, Acousti-Celotex assures the beneficial quiet and comfort they need. Adjacent hallways, too, "quiet down" immediately with modern Sound Conditioning.

For a very moderate cost, Acousti-Celotex Sound Conditioning materials can be quickly installed to suit any Sound Conditioning requirement. No special maintenance is needed, and you can paint and wash Acousti-Celotex tile repeatedly!

**FOR A FREE ANALYSIS** of your noise problems write today for the name of your nearest distributor of Acousti-Celotex products. A free copy of "Quiet and Comfort for School and College" will be sent upon request. Address The Celotex Corporation, Dept. V-5, 120 S. La Salle St., Chicago 3, Ill. In Canada, Dominion Sound Equipments, Ltd., Montreal, Quebec.



## ACOUSTI-CELOTEX

TRADEMARK
REGISTERED
U. S. PAT. OFF.

### Sound Conditioning Products

PRODUCTS FOR EVERY SOUND CONDITIONING PURPOSE

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



# JOHNS-MANVILLE

22 East 40th St., New York 16, N. Y.



OFFICES IN ALL LARGE CITIES

## UNIT CONSTRUCTION FOR SCHOOLS



Johns-Manville Unit Construction provides the ideal solution to the workshop requirements of the Industrial Arts Department, North Carolina State College at Raleigh. J-M Acoustical Ceilings with recessed troffers for fluorescent lighting, J-M Movable Walls and J-M Asphalt Tile Floors can be easily adapted to any future space rearrangement.

### THE COMPLETE INTERIOR—WALLS, CEILINGS, FLOORS

The educational needs of any community are constantly changing. Often it becomes desirable to expand or subdivide schoolroom units or to convert a school from one type to another, as from grade school to junior high or from academic to vocational. Johns-Manville Unit Construction provides a practical, proved and economic method to give school buildings this needed flexibility.

J-M building materials—Movable Walls—Acoustical Ceilings—Terraflax Plastic Asbestos or Asphalt Tile Floors—are united in Unit Construction under one specification and one manufacturer's responsibility.

Of course, the building materials in the System can be used independently or any two can be combined for a particular service. Illustrations and descriptions of the individual materials used in the Unit Construction system appear on the following page.

Representatives in Johns-Manville offices, located in all large cities in this country and Canada, will be glad to give you complete information on Unit Construction for schools or details on any of the building materials used in this system of construction.

**THE AMERICAN SCHOOL AND UNIVERSITY—1950-51**



### JOHNS-MANVILLE MOVABLE WALLS

J-M Movable Walls, the keystone for flexibility in Unit Construction, can be dismantled and relocated as educational needs require. Recently, Johns-Manville developed an integrally colored panel for its movable wall system. The color goes all the way through each panel, eliminating painting and decorating expense. Called Transitone, these beautifully textured, fireproof walls come in two attractive colors—light green and light tan.



### JOHNS-MANVILLE ACOUSTICAL CEILINGS

Acoustical Ceilings, an important factor in helping to overcome the handicap of distracting noises, are beneficial to teacher and student alike. They give the desired degree of quiet for effective teaching, eliminate frequent causes of nervousness, and are proved aids to concentration. An exclusive J-M patented construction system permits interchangeability of flush-type fluorescent lighting and acoustical ceiling units. J-M Acoustical Ceilings are easily maintained.



### JOHNS-MANVILLE DECORATIVE FLOORINGS

J-M Decorative Floorings are available in two types in a variety of attractive colors. Both types withstand the hard wear and abuse expected in any school building.

**TERRAFLEX** is the new Johns-Manville plastic-asbestos tile. Outwears other types *two-to-one!* Units are unaffected by greases, oils, alkaline moisture . . . come in clearer, brighter colors. For the best, use Terraflex.

**J-M ASPHALT TILE** has been the standard of quality for years. Made of asbestos and asphalt, these units provide quality flooring at low initial cost.

## J-M FLEXSTONE BUILT-UP ROOFS

J-M Flexstone \* Asbestos Built-Up Roofs are most satisfactory for school service for the reasons of economy and fire-protection.

The asbestos felt used in the Flexstone Roof does not support combustion and therefore provides superiority in fire-resistance over the ordinary roofing felt.

Since asbestos has the durability of stone, long exposure to sun, rain and weather have little effect on these roofs. Because Flexstone Roofs are rot-proof, they need no periodic coating. Because they are smooth-surfaced, there is no excess weight of slag or gravel. Furthermore, maintenance costs are comparatively low.

Many Flexstone Built-Up Roofs, applied 25 and 30 years ago, are still giving service with little or no upkeep. For complete details, consult your nearest Johns-Manville Sales Office.

\* Reg. U. S. Pat. Off.



Bonded for 10 years — still going strong after 25 years of service! That's the record of the J-M Flexstone Built-Up Roof on the Poly Prep Country Day School, Brooklyn, N. Y. It is typical of the service provided by these better built-up roofs

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

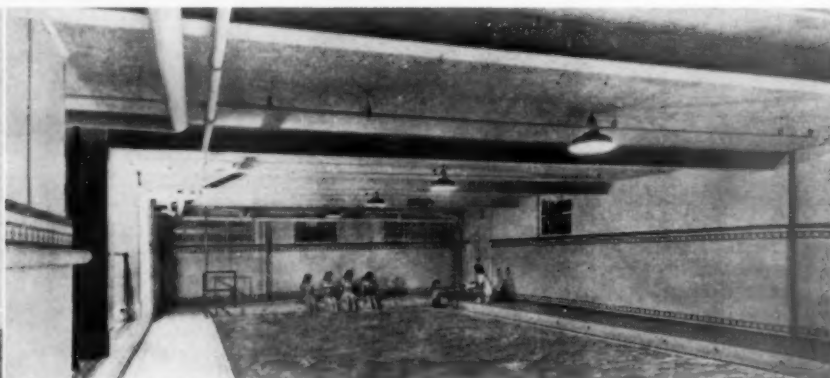
## SPRAYED INSULATION INC.

56-58 Crittenden Street, Newark, N. J.

Acoustical Fibre Insulation



Corridor, Sun Valley Junior High School, Sun Valley, Calif.



Swimming Pool, Kimberly School, Montclair, N. J.

**SprayKote** for acoustical correction, sound deadening, fireproofing, boiler room insulation and condensation control.

SprayKote, a sprayed on asbestos-mineral wool fibre, applied to any surface, does more than merely lower the noise level in any particular room. It has an extremely high value in the prevention of transmission of sound from room to room and floor to floor, which is so necessary in music rooms, typing rooms, manual training shops, gymnasiums and cafeterias. A monolithic ceiling without confusing lines and holes, conforming to any type or style of architecture and decorative scheme, presents a ceiling with which

the mind has no problem. Can be applied direct to masonry construction, eliminating the furring and lath. A fireproof product Attested to by Underwriters Laboratories, Chicago, for a three-hour fire rating.

Where the beams and ducts are treated the ducts are sound deadened, so that noises are not conducted through the heating or air conditioning system.

SprayKote is installed by authorized applicators throughout the United States. Complete information upon request or see Sweet's Catalog.

### List of Typical Installations

National Bureau of Standards, Washington, D. C.

Wilton Center School, Wilton, Conn.

Sienna College, Loudonville, N. Y.

Burbank High School, Burbank, Calif.

Public School #22, Bronx, N. Y.

Columbia University, New York City

Harding School, El Centro, Calif.

Immaculate Conception Seminary, Darlington, N. J.

Public School #35, Brooklyn, N. Y.

Ladera Park School, Los Angeles, Calif.

Dartmouth College, Hanover, N. H.

Public School #164, Kew Gardens, N. Y.

Southern Normal School, Brewton, Ala.

Public School #26, Jamaica, N. Y.

Perth Amboy High School, Perth Amboy, N. J.

Warren Lane School, Inglewood, Calif.

Nat. Geographic Society, Washington, D. C.

Public School #174, Forest Hills, N. Y.

Newhall School, Newhall, Calif.

Mt. St. Mary's College, Emmitsburg, Md.

Rutgers University, New Brunswick, N. J.

Pennsville High School, Penns Neck, N. J.

Old Greenwich School, Greenwich, Conn.



Classroom, Lincoln School, El Centro, Calif.



Classroom, Wilson School, El Centro, Calif.



# THE RUSSELL R. GANNON CO., INC.

Manufacturers of

Custom-Built Heating and Ventilating Equipment to Fit  
the Needs of Each Individual School

Norwood 12, Ohio

## GANNON HEATING and VENTILATING SYSTEMS

offer advantages you  
can't afford to overlook.



GANNON offers two models: 1) Outside unit, located inside the classroom, under the window (illustrated); 2) inside unit, located outside the classroom on corridor wall, with fresh air coming from the roof. These two models meet all schoolroom requirements.

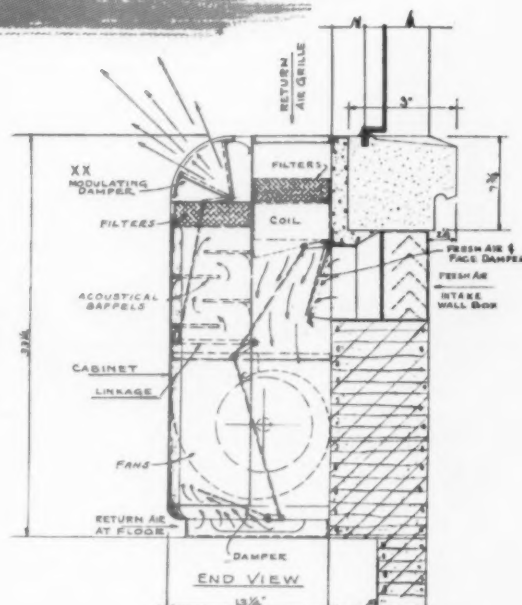
### For example:

- Lower initial cost
- More economical to operate and service
- Quieter (cabinet is lined with acoustical material), and more efficient
- Lower installation cost—uses smaller pipe sizes—either hot water or steam, and smaller boilers
- No freezing of coils
- Plenty of fresh air without drafts
- Uniform temperature under all conditions
- Makes use of more secondary air motion
- Does not destroy normal balance of negative and positive ions in fresh air
- No unsightly openings in outside walls
- Kills airborne bacteria, thus minimizing contagion, and cross infection

Damper (XX in drawing at right) modulates with change in temperature of air delivered to occupied area. Diffuses cold air without drafts. When aspect ratio changes, this automatically increases or decreases the velocity, thereby increasing or decreasing the amount of secondary air. As the direction of air discharge is changed, the cold air together with induced secondary air is mixed with the warm air at the ceiling. Air velocity, direction and aspect ratio are changed by automatic control from room thermostat. Good distribution of heat and fresh air is assured at all times.

GANNON SYSTEMS, the result of twenty-five years of research and development, give pupils the right kind and amount of air to keep them alert and healthy. School executives tell us that GANNON SYSTEMS help to maintain high attendance figures.

It will pay you to investigate the outstanding features incorporated in GANNON SYSTEMS. Write for complete specifications.



# PETROLEUM HEAT & POWER COMPANY

Main Office and Factory

Stamford, Conn.

Oil Burning Equipment—Since 1903—Fuel Oil

## PETRO

REG. U. S. PAT. OFF.

INDUSTRIAL AND COMMERCIAL OIL  
BURNING SYSTEMS FOR AUTOMATIC,  
SEMI-AUTOMATIC OR MANUAL OPERATION

### FOR UNHEATED COMMERCIAL OILS:

**Model W-A:** Automatic ignition with synchronized control of oil and air.

**Model W-SA:** Automatic variation of firing rate with manual ignition. Or manual variation with manual ignition.

**FOR HEATED OILS: HEAVY NO. 5 (Models W-A-E and W-SA-E); BUNKER "C" NO. 6 (Models W-AH and W-SAH)**

**Models W-A-E; W-A-H:** Automatic ignition with synchronized control of oil and air, and automatic control of oil heaters.

**Models W-SA-E; W-SAH:** Automatic variation of firing rate with manual ignition. Or manual control of oil and air with manual ignition. Manual control of heaters.

### PETRO MODEL W ROTARY-CUP OIL BURNERS:

A Petro Model W consists of a self-contained assembly of fan, pump, rotary cup atomizer and all oil and air adjustment apparatus. It is either direct-driven by means of a built-in motor, or belt-driven from motor mounted on burner housing. Interlocking oil and air control mechanism permits operation at any point within the burner's minimum and maximum range.

### MODEL W-A-E FOR HEAVY NO. 5 OIL REQUIRING ONLY MODERATE PREHEATING:

Petro Model W-A-E meets today's growing need for a burner to handle the more viscous No. 5 oil that is becoming increasingly available. Such oil has a viscosity from 300 seconds Saybolt Universal at 100°F to 40 seconds Saybolt Furoil at 122°F.

A Petro Model W-A-E is equipped with a thermostatically-controlled electric heater. In all other respects it resembles the famous economical Petro Model W-A for burning cold No. 5 oil. It is supplied in all Model W-A sizes except W-8½ and W-9.

### THERMAL VISCOSITY CONTROL:

Dependable and accurate control of oil viscosity—and hence of oil flow and combustion efficiency—is provided through automatic control at oil temperature. This basic principle underlies the Petro Thermal Viscosity Control System.

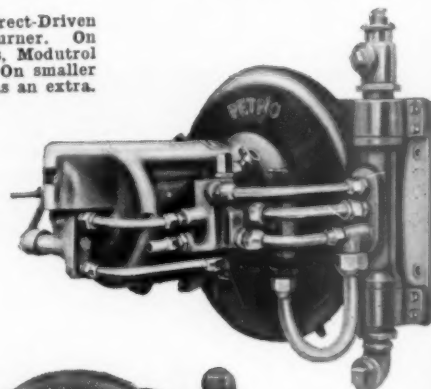
### MODULATED FIRE CONTROL:

Standard equipment on Model W-6 and larger burners, and supplied as an extra on smaller sizes when so ordered, the Petro Modulating Control provides accurate and completely automatic control of firing operation.

### CAPACITIES OF PETRO MODEL W OIL BURNERS AT 70% BOILER EFFICIENCY

Burner Size	Motor Horsepower	Maximum Gals. per Hour	Rated Capacity Boiler Horsepower	Steam Radiation, Sq. Ft., E. D. R.
W-2 ½	1 ½	11	34.4	4810
W-3	1 ½	15	47.0	6560
W-4	2	25	78.5	10940
W-5	3	35	110.0	15300
W-6	4	50	157.0	21880
W-7	5	70	220.0	30600
W-8	7	100	313.6	43750
W-8 ½	8	120	376.0	52500
W-9	10	145	454.7	63250

\* Model WD-AH Direct-Driven Rotary-Cup Type Burner. On W-6 and larger sizes, Modutrol Firing is standard. On smaller sizes, it is supplied as an extra.



\* Model W-A-E Direct-Driven Rotary-Cup Type Burner. On W-6, W-7 and W-8 Modutrol Firing is standard. On smaller sizes, it is supplied as an extra.

\* Model WO-A Belt-Driven Rotary-Cup Type Burner. On W-6 and larger sizes, Modutrol Firing is standard. On smaller sizes, it is supplied as an extra.



\* All Petro Model W burners are available in either direct- or belt-driven motor types.

OLDEST AND LARGEST ORGANIZATION IN THE WORLD DEVOTED EXCLUSIVELY TO OIL HEATING

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# PETROLEUM HEAT & POWER COMPANY

Main Office and Factory

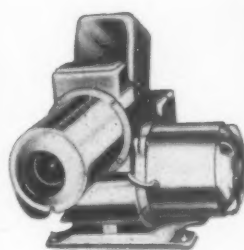
Stamford, Conn.

Oil Burning Equipment—Since 1903—Fuel Oil

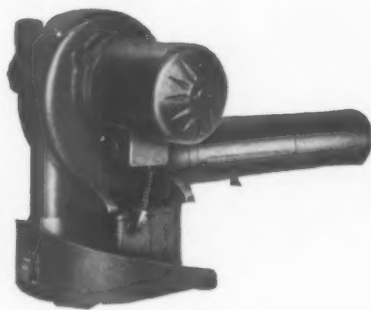
# PETRO

REG. U.S. PAT. OFF.

## OIL HEATING EQUIPMENT FOR DOMESTIC INSTALLATIONS



Petro CA-1 Burner



Petro P-12 Burner

### PRESSURE ATOMIZING BURNERS, MODELS CA-1, P-21, P-22

These Petro burners find wide application to steam, hot water or warm air systems in domestic heating.

They burn No. 2 or lighter fuel oil, the heaviest and lowest priced fuel oil approved by Underwriters for domestic use. They are pressure atomizing burners of the "gun" type, and may be installed with inside or outside fuel storage tanks.

Model CA-1, for average one family homes, has electronic control. When the burner calls for fire, this modern control operates for 30 seconds. It speedily establishes fire, eliminating fuel loss and cutting electric ignition cost. Should flame become irregular, split-second photo-cell action immediately supplies ignition.

### LARGE CAPACITY BURNERS, MODELS P-12, P-13A AND P-13

In addition to domestic heating in large residences, these Petro burners have a wide field of application in many commercial and public buildings such as schools, churches, stores, garages and apartments.

CAPACITY OF PETRO PRESSURE ATOMIZING BURNERS

Burner Model	Nozzle Size, Gals. per Hr.	TOTAL CAPACITY *		Approximate Ship. Wgt.
		Steam, Sq. Ft.	Hot Water, Sq. Ft.**	
CA-1	1.00 to 2.00	350 to 700	560 to 1120	85
P-21	2.00 to 4.50	700 to 1575	1120 to 2520	120
P-22	3.00 to 6.00	1050 to 2100	1680 to 3360	135
P-12	6.00 to 10.00	2100 to 3500	3360 to 5600	190
P-13A	9.00 to 12.00	3150 to 4200	5040 to 6720	250
P-13	12.00 to 18.00	4200 to 6300	6720 to 10080	250

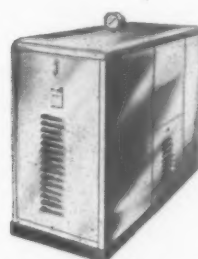
\*Total capacity equals standing radiation, plus piping loss, plus pickup, plus domestic hot water.

\*\* Rating based upon water at 170°F in radiators.

### PETRO HI-THERM OIL HEATING UNITS

The Petro Hi-Therm Boiler delivers steam in as little as 43 seconds in normal operation. Such exclusive features as its double-incline fire pass, extra heating surface area, and electronic burner assure faster heating at reduced fuel cost.

Available with or without 3 gpm domestic hot water coil; in two sizes for steam or water: Model HT-S3 rated 375 sq. ft., and HT-S4, 450 sq. ft., steam net standing radiation; Model HT-W3, 600 sq. ft., and HT-W4, 720 sq. ft., water.



Petro Hi-Therm Boiler Unit  
—Models HT-S and W



Petro Hi-Therm Warm Air  
Conditioner—Model HT-A3

The Petro Model HT-A3 Hi-Therm Warm Air Conditioner is a compact, electronically controlled unit, designed for the average one-family home. Available with or without 3 gpm domestic hot water coil. Only 20" wide, 48" deep, 61½" high; requires less than 7 sq. ft. floor area. Rated 110,000 BTU at bonnet, 90,000 BTU at register. Capacity 1250 cfm.

### OTHER PETRO HEATERS

Petro Models TS and TW Automatic Steel Boilers are popular where head room is less important than floor area in the small home field. In two sizes: 400 and 575 sq. ft. steam, 600 and 920 sq. ft. water.



Petro Automatic  
Steel Boiler—  
Models TS and  
TW



Petro Winter Air Con-  
ditioner—Models A-75,  
A-95 and A-115



Petro Model TD-  
21B Storage-  
Type Hot Water  
Heater

Petro Winter Air Conditioner, direct fired, 3 sizes, rated at 75,000, 95,000 and 115,000 Btu per hr. at register.

Petro Model TD-21B Storage-Type Hot Water Heater operates automatically on No. 2 oil and heats 120 gal. per hr., 100°F temperature rise.

Send for Catalog of Petro Domestic Oil Heating Equipment

OLDEST AND LARGEST ORGANIZATION IN THE WORLD DEVOTED EXCLUSIVELY TO OIL HEATING

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

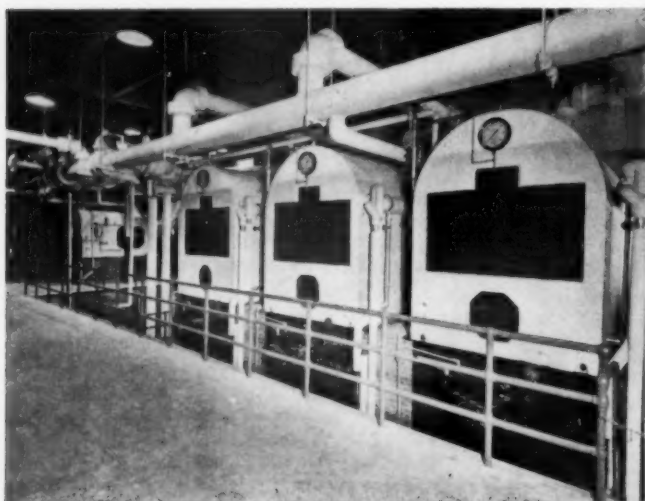


# THE INTERNATIONAL BOILER WORKS CO.

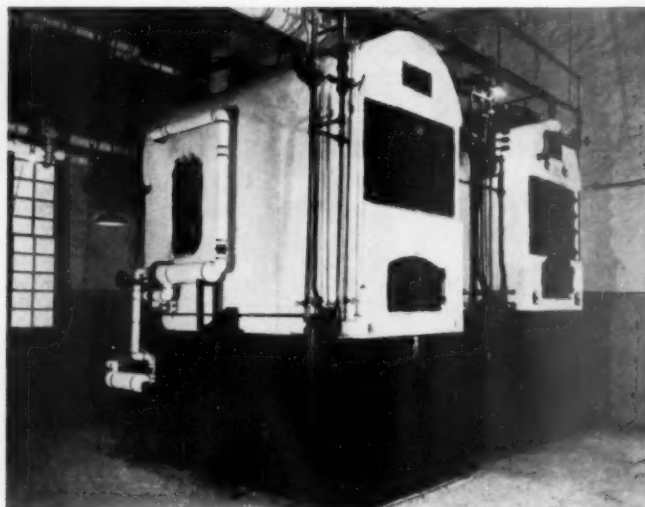
Works and General Offices: East Stroudsburg, Penna.



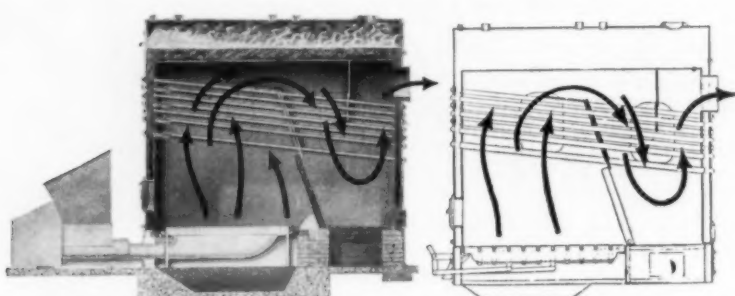
**SALES OFFICES IN PRINCIPAL CITIES**



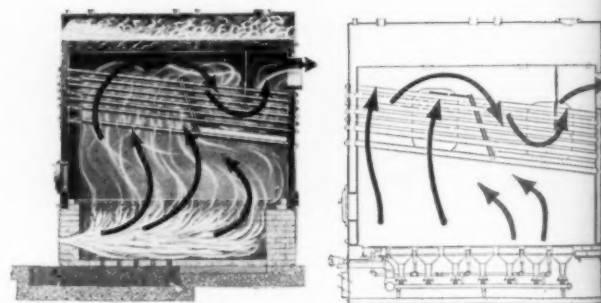
**EAST GREENBUSH SCHOOL** — East Greenbush, N. Y.  
*Four International Type C Boilers. J. Russell White, Architect.*



**HAVERFORD COLLEGE — Haverford, Pa.**  
*Two International Type C Boilers*

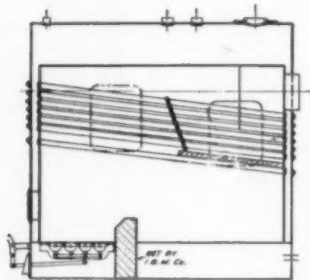


### Baffled for Coal, Stoker or Hand Firing



### Baffled for Oil or Gas

## International Water Tube Boilers Are Baffled to Give Most Efficient Performance with the Type of Fuel to Be Burned



fuel or power, the incinerator grates can be used for burning coal. This insures the building against damage or shut-down due to lack of heat.

### TYPE C — TWIN SECTION

### For Replacement of Old Boilers

**NO FIELD WORK REQUIRED**

When the limiting dimension for entry of a boiler into an existing boiler room is the width of a door or

passageway, the Type C Twin Section is recommended.

3 PIECE TYPE KD —

### MINIMUM FIELD WORK REQUIRED

When the limiting dimensions for entry of boiler are both width and height of an existing door or passageway, the Type KD—Three Piece boiler is recommended.

International "Fuel-Saver" Water Tube Heating Boilers are installed in Schools, Colleges and Universities throughout the United States.

**Lists of installations are available upon request.**

Our engineering department is available for application and installation problems and our representatives in principal cities are well qualified to answer any detailed questions regarding design and performance of International Water Tube Heating Boilers.

MODERATE  
INVESTMENT

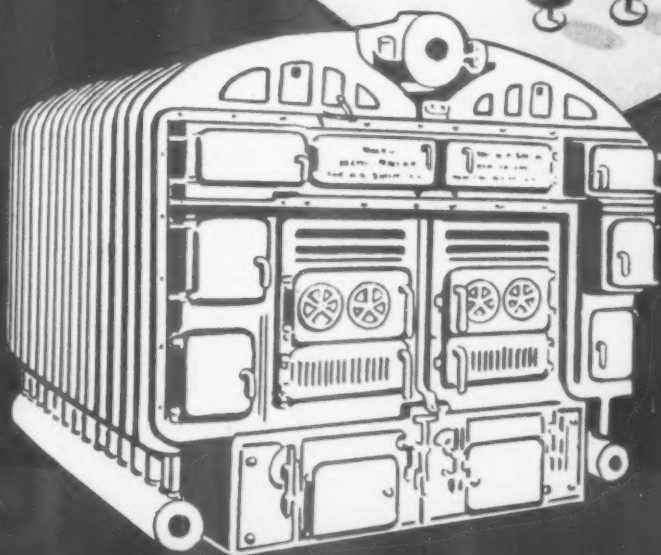
LOW FUEL COST

LONG LIFE

QUICK  
RESPONSE

ABILITY TO  
EXPAND AS  
THE SCHOOL  
GROWS

LOW MAINTENANCE  
LOW UPKEEP

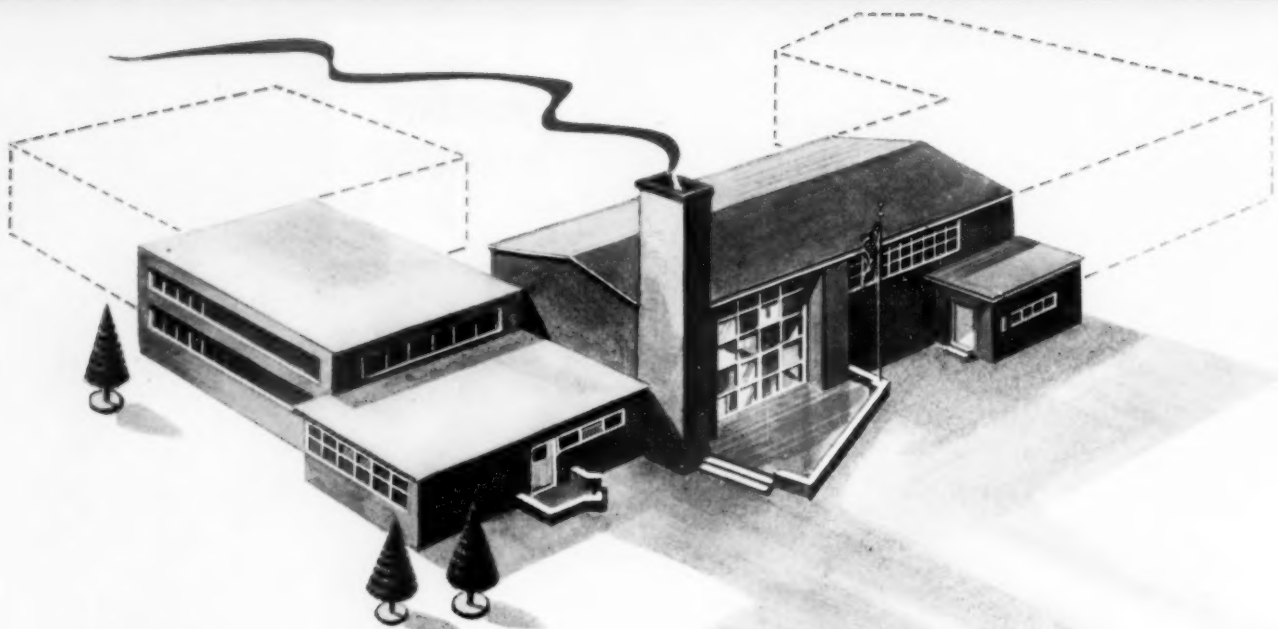


**H. B. SMITH CO., INC.**

Westfield

Massachusetts

Established 1853



# FUTURE NEEDS

*exceed initial outlay in importance*

The School Board, Committee or Architect to whom the planning of a new school is entrusted naturally undertakes great responsibilities.

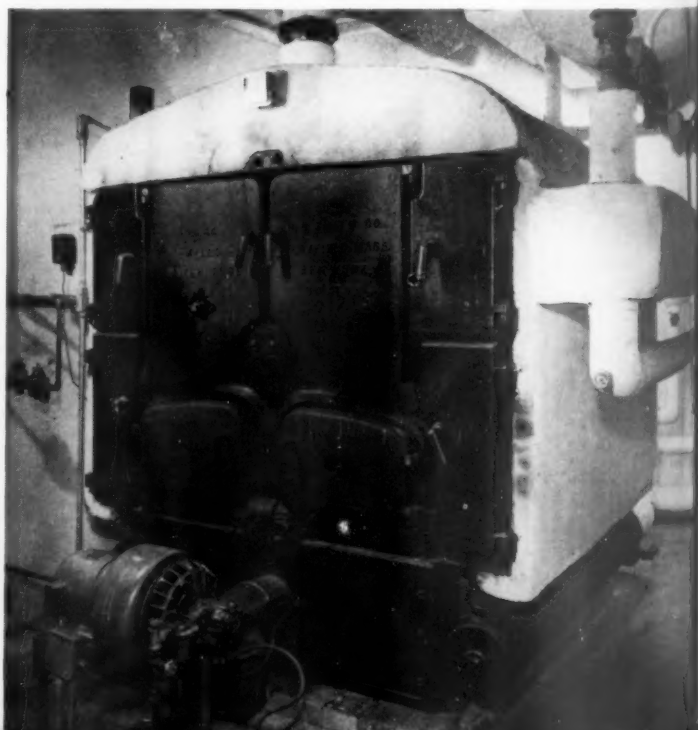
Chief among these, most authorities agree, is the selection of the school boiler plant. Because the operation and maintenance of the boiler system represent by far the greatest single expense to be borne — for the entire life of the school — extreme care should be observed in making this choice. Over a 20-year period, for example, the amount paid for fuel will be many times the initial cost of the boiler.

Too, the prudent planner will assume a perspective which allows a clear conception of the school's future development as regards boiler plant requirements. Many examples have illustrated forcefully that an advantage of perhaps only one hundred dollars in the boiler purchase

price has proved to be false economy — a "saving" far overshadowed by subsequent costly repairs or replacement.

Economy of operation, low maintenance cost, long life, adaptability and ease of expansion, therefore, should be prime considerations. The following pages show, by actual case histories, how these and other important requisites are met by H. B. Smith cast iron boilers.

*Typical school installation of an H. B. Smith oil-fired boiler showing compact size and absence of complicated controls.*





# H. B. SMITH BOILERS ARE DESIGNED FOR HIGH EFFICIENCY

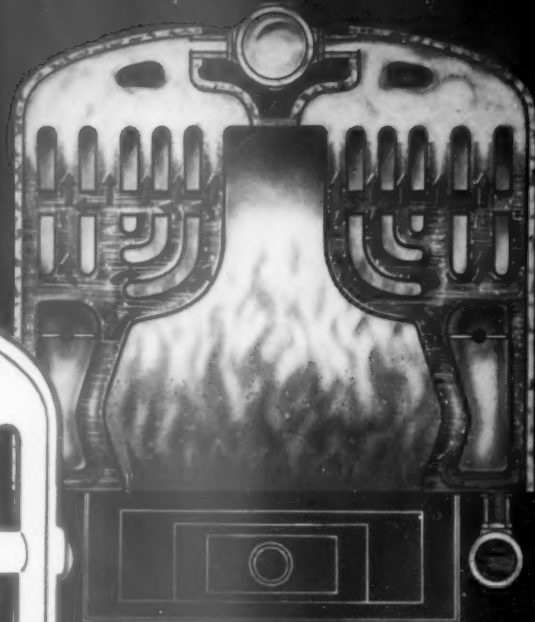
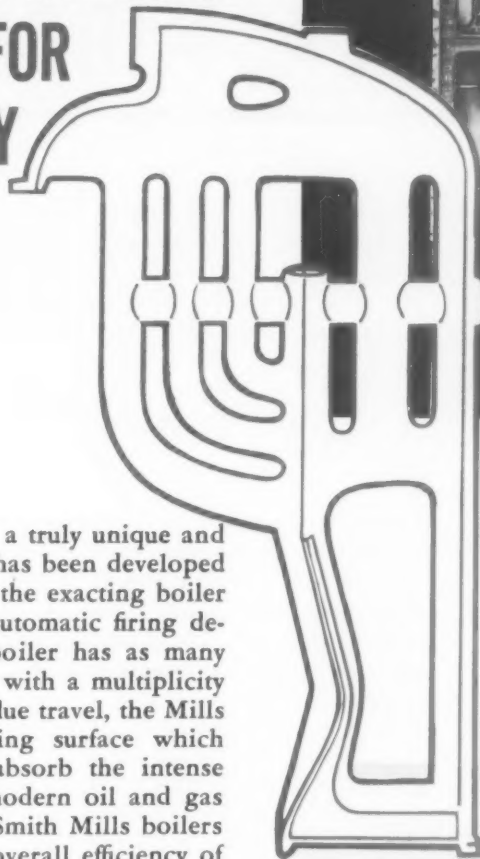
The Mills Water Tube Boiler is a truly unique and different cast iron boiler which has been developed by H. B. Smith engineers to fill the exacting boiler plant requirements of modern automatic firing devices and systems. No other boiler has as many outstanding features. Designed with a multiplicity of water tubes and a prolonged flue travel, the Mills boiler provides the extra heating surface which must be present to efficiently absorb the intense blast-like flames generated by modern oil and gas burners. The ratings of H. B. Smith Mills boilers are conservatively based on an overall efficiency of 80% with combustion conditions of 10% CO<sub>2</sub>. This indicates the high standard of performance which may be expected from these units.

## LOWER CHIMNEYS WITH H. B. SMITH BOILERS

Because of the fact that H. B. Smith Mills boilers have such a large quantity of heating surface — more than any other boiler of comparable physical dimensions — it might well be expected that there would be greater draft loss through the boiler, and hence a higher chimney would be needed. Due to the unique Mills type design, however, actually the reverse is true. There is so little draft loss through this boiler that lower chimneys can be used and hence it is not necessary for the school architect to restrict his choice either to conventional boilers with high disfiguring chimneys or units requiring complicated induced draft mechanisms which are difficult to keep in adjustment.

## H. B. SMITH BOILERS READILY CONVERTIBLE

Today most H. B. Smith boilers are installed with automatic firing devices. Still they may be converted to hand fired solid fuels, if it should be necessary to do so. Many H. B. Smith boiler owners were especially pleased with this convertible feature during the War when it often was necessary to shift from fuel to fuel.



*Sectional view showing multiplicity of water tubes and prolonged flue travel. Note the extra heating surface for efficient absorption of intense flames generated by modern oil burners.*

*Left: Smith boiler section showing tubular design and large amount of heating surface.*



*Above: Clarksville, New York's Junior and Senior High School is an example of a recent installation, as is the Elementary School of Burlington, Connecticut, below. These schools were selected by the Architectural Forum and Architectural Record, respectively, as the two outstanding schools of their size.*



# PERSONAL SURVEY PROVES LONG LIFE AND LOW-COST MAINTENANCE OF H. B. SMITH CAST IRON BOILERS



In the spring of 1950, The H. B. Smith Company decided to conduct a very extensive survey to determine boiler maintenance costs. To accomplish this, it was decided to visit personally every school installation of H. B. Smith boilers within three adjoining counties in New England. None of these counties contained a city of over 200,00 people.

## 81 SCHOOL BUILDINGS SURVEYED

A man was assigned to this task. He, personally, visited every school boiler room in this area in which an H. B. Smith boiler was installed and made a thorough check as to its age and past history. He visited 81 school buildings in which were installed 119 H. B. Smith header type cast iron boilers. These boilers, of course, had been installed for varying periods of time, and averaged 24.1 years in age. Breakdown by age is as follows:

10 years and under	14
11 - 20 years	18
21 - 30 years	58
31 - 40 years	24
41 - 50 years	5

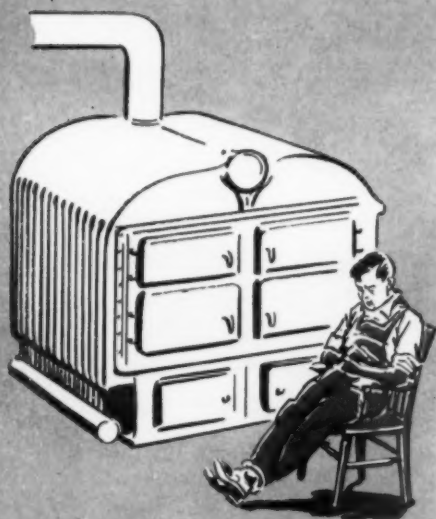
## FAILURE CHANCES VERY SLIGHT

These boilers had a combined total of 3,176 sections. In the complete time that they have been installed, 39 sections have been replaced. The causes of these failures are as follows:

Low water	28
Flood waters	5
Strain in setting	3
Factory defect	1
Freeze-up	1
Plugged nipple	1

It should be noted that low water accounted for the great majority of these failures. This is a condition, of course, that is entirely due either to the failure of automatic protective devices or, what is more likely, the negligence of the man having charge of the firing or maintenance of the boiler. In only one case — a bad low water situation — had enough sections cracked to require a shutting down of the boiler plant. In all other cases the cracked sections were cut out, the headers plugged, and the boilers continued in operation until section replacement could be made in the summer.

What is truly amazing is the fact that, even with this ordinary human factor taken into consideration, only 39 sections cracked during this entire period for all types of reasons. To put this another way, with an H. B. Smith cast iron sectional boiler, there is an average section loss of 1.23% or only one chance in 81 that a section will be lost in any given year, and only one chance in three that even as much as a single section will be lost in 24 years of operation.



REPLACEMENT  
ORDER

ORDER NUMBER

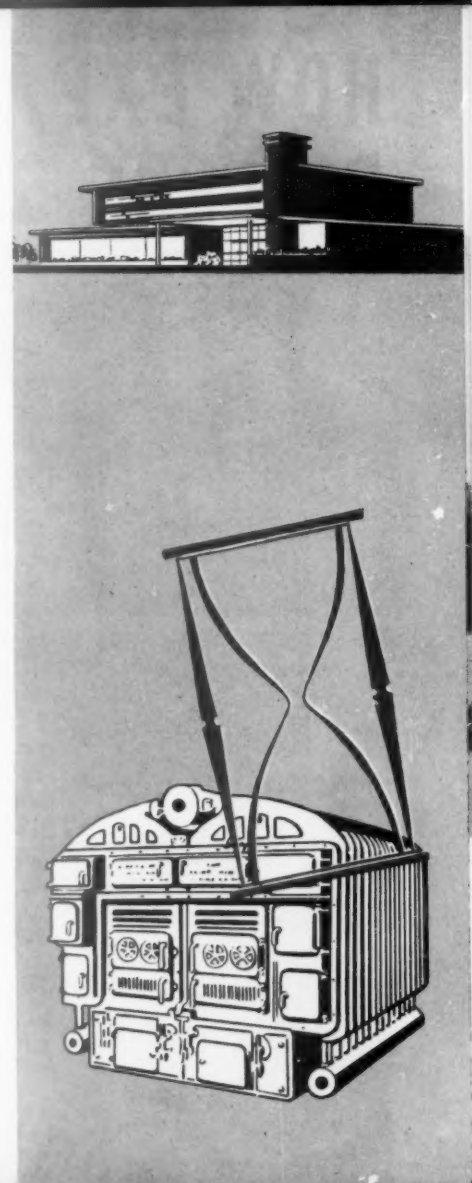


## SPEND SCHOOL FUNDS FOR EDUCATION

Of course, most school departments reported that it was necessary to make minor repairs on their older boilers from time to time, such as furnishing new grates for coal-burning boilers, and minor items of trim, such as doors, door frames, etc. In all cases, however, these repairs were such minute items that they were always absorbed out of cash funds. It was never necessary to make any special requests to the school department or to the city for major repairs, such as replacements of steel boiler tubes. This, of course, has resulted in a very favorable feeling by school department officials who prefer to use their funds each year for educational benefits. No school department likes to have to spend its funds in constant repairs to its plant where such expense merely renews existing facilities and does not contribute to doing a better educational job. Over a period of years, with a school department running several or many schools, this saving amounts to a very appreciable sum of money.

## OLD BOILERS STILL GOING STRONG

In connection with this survey, it was interesting to note that the older boilers studied; that is, those over 30 years old were all in good condition and replacements were not being considered by the school departments interviewed. In other words, this older equipment was doing a good job and still had many years of useful life ahead.



*These two cast iron Smith-Mills boilers were installed in 1884, the year of Grover Cleveland's first election to the presidency. Now, some 66 years later, they still perform with customary efficiency, even though the only repairs they have undergone have been the replacement of a few grate bars.*





# HOW EXPANSION FEATURE OF SMITH BOILERS SAVED TIME AND MONEY FOR TWO SCHOOLS



The original cast iron boiler of the East Williston, N. Y., North Side School (built in 1917) was replaced in 1921 by an H. B. Smith boiler. When an addition to the building was constructed in 1925 a second Smith boiler was installed.

Another new wing was added in 1929 and the boilers were expanded from two 9-section to two 12-section 60 Smith series to provide for this new heating load.

The boilers were hand-fired, but in 1935 one was converted to stoker firing, using bituminous coal, and it was found that this boiler was large enough to carry the load in mild weather.

In 1949 a new wing was added, consisting of eight classrooms, a kindergarten, athletic dressing rooms, fully equipped cafeteria, reference library, teachers' room, clinic, office and supply room. The boilers again were increased, this time from 12 to 14 sections each, and were converted for burning heavy oil.

The original sections of each boiler — after 29 and 25 years of service — are still in use today.

Many dollars were saved by the District through the use of Smith cast iron boilers, since only additional sections were necessary each time the building was enlarged, whereas if a steel boiler had been used originally it would have necessitated the purchase of another complete boiler. Also, difficulty would have been experienced in bringing in the second steel boiler due to insufficient entry space to the building. Then, to complete the building program it would have been necessary to install a third boiler (instead of the present two) at considerable expense, and again make extensive construction changes to bring the boiler into the building and to provide additional boiler room space.

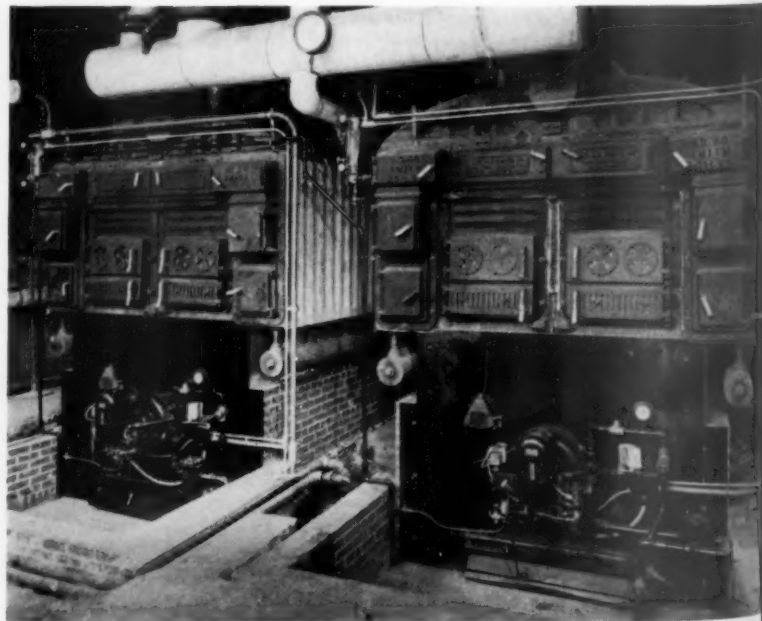


## PENN WYNN ELEMENTARY SCHOOL'S BOILERS KEEP PACE WITH ADDITIONS

Two 10-section oil-fired 60 Smith boilers were original equipment in the Elementary School at Penn Wynn, Pa., when it was built in 1930.

In 1949 the school was expanded, and the boilers were increased to 26 sections each. At this time one boiler remained in service while the other was enlarged, and the larger boiler took over the job while the second boiler was increased in size; thus service was not interrupted. The only new parts furnished — besides new nipples — were those required to increase the capacity.

The Engineers, Architect and School Board had considered installing two steel boilers to take over the increased load since they felt that the cast iron boilers had given all the service which should be expected of them. But an inspection revealed that the Smith boilers would be good for at least another 20 years and it was decided to expand the original units — a decision that meant a saving of \$3,724.



# EXPERIENCE OF SIMSBURY SCHOOLS TYPICAL OF SMALL-TOWN SYSTEMS

Typical of the experience of the small-town school systems using H. B. Smith boilers is that of Simsbury, Connecticut, where three of the four schools rely on H. B. Smith installations.

In the High School an H. B. Smith unit has been in service since the school was built in 1907, with no major repairs having been necessary. When the school was enlarged in 1927 a second Smith boiler was installed. These burned coal until the mid-30's when they were converted to oil. This fuel was used until the war, when coal stokers were employed, and the system was reconverted to oil following the war.

The next oldest H. B. Smith installation is in the Central Grammar School where a Smith boiler has been in use since the school was built in 1913. This was supplemented by a second Smith unit when the school was expanded in 1918. In 1946 the original boiler was cleaned, overhauled and renippedled at a total cost of \$594, and is now good for another 20 years of service.

The original boiler of another make, installed when the South Grammar School was built in 1927, was replaced in 1939 by an H. B. Smith boiler, and this has not required service or repairs since.

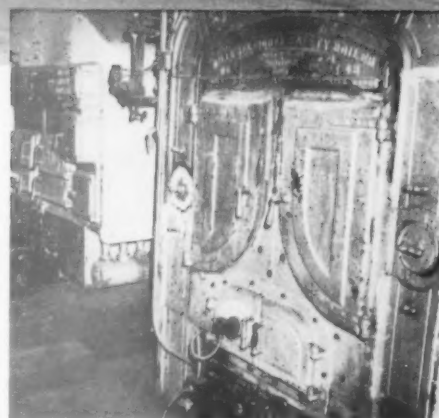
Thus over a total period of 146 H. B. Smith boiler years in Simsbury schools, the amount spent for repairs has been only \$594 (and this on a single boiler after 33 years' service) — an average maintenance cost of about \$4 per year for the five Smith boilers in the school system, with no outlay to be made for repairs in the immediate future.

The Tarrifville Grammar School, fourth in the Simsbury system, is equipped with a cast iron boiler of other manufacture. The oil consumption for this school is at the rate of 4.77 gallons per square foot of steam radiation per year. The average of the other three schools with H. B. Smith boilers is 3.92 gallons per square foot per year. In other words, the H. B. Smith boilers cost 18% less to operate than do the other boilers.

Not only may this small-scale example be multiplied to illustrate the comparable economy of H. B. Smith boilers in large-city school systems, but it should be remembered that the savings remain effective for the many years during which Smith boilers are supplying virtually maintenance-free service.



*Right: Long-service H. B. Smith boiler installation in Simsbury High School, Simsbury, Connecticut. School building is shown above.*



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**THE H. B. SMITH COMPANY, INCORPORATED**  
WESTFIELD • MASSACHUSETTS

Established 1853

THE MOST COMPLETE LINE IN THE WORLD OF CAST IRON BOILERS FOR STEAM



*Your*

*Schoolrooms*

have four basic requirements for thermal comfort: Quick, economic heating; heat plus ventilation; cooling; control and balance of heating and ventilating factors on a room-by-room basis. All these requirements are met by the Nesbitt Series 500 Syncretizer. In addition, Nesbitt meets a fifth requirement—self-imposed—a means of controlling the minimum air discharge temperature. This additional advantage is available *only* with the Nesbitt Series 500 Syncretizer.

Regardless of outside temperature, the Syncretizer always provides the desired minimum quantity of outdoor air to occupied rooms. All day long the column of air discharged by the Syncretizer provides a "thermal blanket" between cold outer walls and room occupants, protecting their comfort and health.

No other unit ventilator is equipped to match the comfort and economy of the Nesbitt Syncretizer.

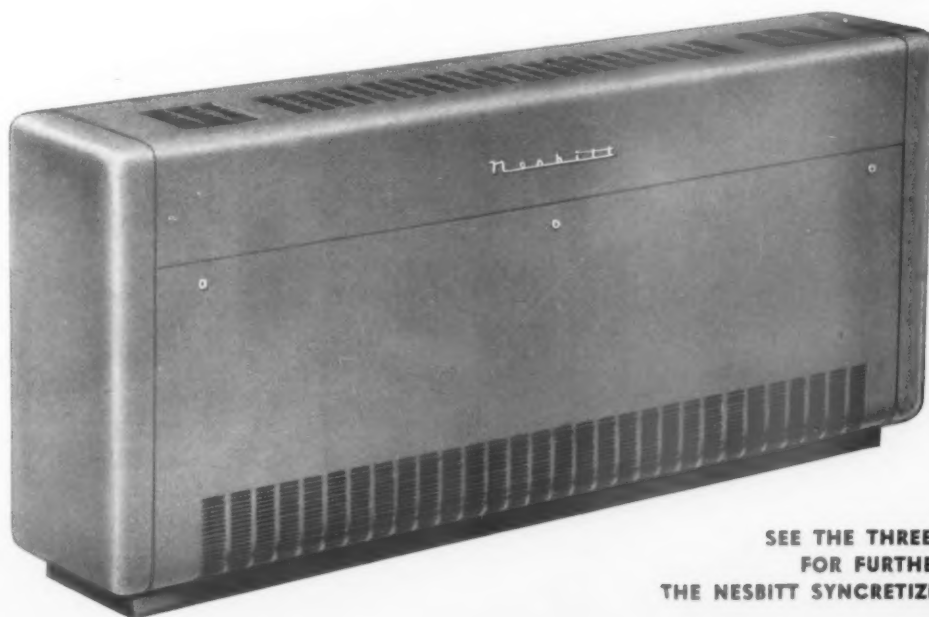
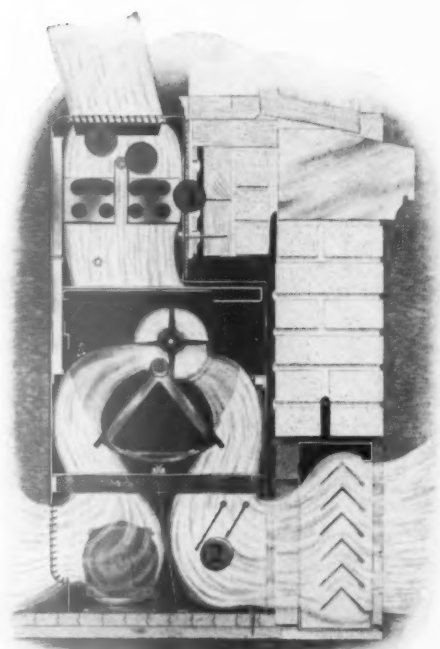
*Exclusive NESBITT Features:*

- (1) COMFORT CONTROL, relates minimum air-stream temperature to changing outdoor temperatures providing ADDED COMFORT to the room.
- (2) AIR VOLUME STABILIZER, prevents excessive amounts of outdoor air from entering the unit. Saves fuel.
- (3) UNIFORM AIR DISCHARGE TEMPERATURES over entire discharge area assured by Nesbitt Dual Steam-distributing tubes inside the Syncretizer radiator.
- (4) DIRECTED-FLOW ADJUSTABLE OUTLET, offering a discharge pattern best suited to each classroom.

**NESBITT**

*Syncretizer*

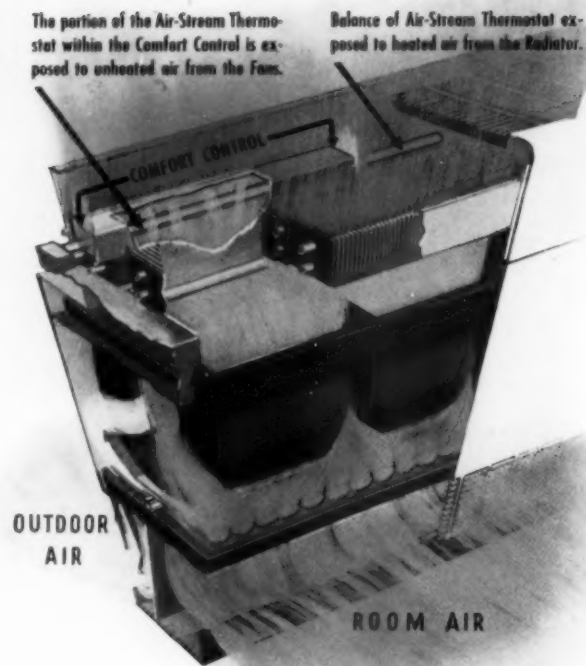
THE UNIT VENTILATOR  
THAT SETS A NEW STANDARD  
OF CLASSROOM COMFORT



SEE THE THREE PAGES FOLLOWING  
FOR FURTHER INFORMATION ON  
THE NESBITT SYNCRETIZER UNIT VENTILATOR

THE NESBITT SYNCRETIZER UNIT VENTILATOR—SERIES 500—THE NESBITT PACKAGE

*Exclusive*



The portion of the Air-Stream Thermostat within the Comfort Control is exposed to unheated air from the Fans.

Balance of Air-Stream Thermostat exposed to heated air from the Radiator.

## COMFORT CONTROL

The real threat to classroom comfort lies in the cold walls and exposed surfaces—especially in the large window area—which rob the occupants of body heat on cold days, even when the room thermostat registers 70 degrees. The built-in Comfort Control of the Nesbitt Syncretizer answers this problem by constantly sampling the outdoor air and automatically adjusting the minimum temperature of the ventilating air stream—warmer as the outside temperature falls, cooler as the outside temperature rises.

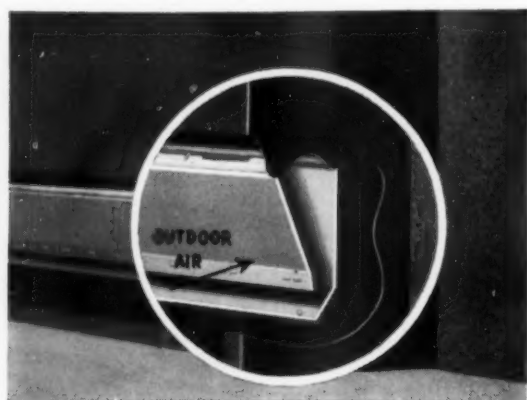
Control of the air-stream temperature passes over to the Comfort Control after the room thermostat has been satisfied. Outside temperatures thus have a direct voice in controlling the minimum temperature of the air stream discharged into the room.

This highly desirable provision of a "thermal blanket" in colder weather does not affect the capacity of the unit to provide maximum cooling in milder weather when needed to prevent overheating. The automatic balance between air-stream and outdoor temperatures results in perfect harmony of air-stream and room temperatures.

THE COMFORT CONTROL, an amazingly simple device, is an integral part of the radiator assembly. It does not entail the use of complicated controls but operates thermally on the air-stream thermostat itself to produce the desired effect. A part of this thermostat is exposed to heated air discharging through the heating element. The remaining part of the instrument is shielded from the heating element, and is exposed to the unheated air introduced by the fans. A boxed channel through the heating element permits access of the unheated air. (The photograph of the Nesbitt Radiator on the page opposite, clearly shows this channel.) The channel cover extends over the header and encloses the unheated end of the thermostat.

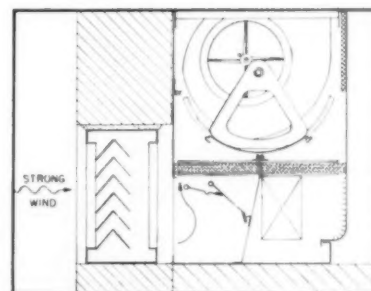
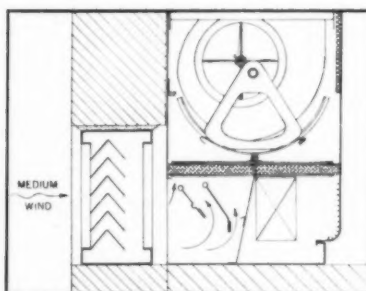
### MINIMUM AIR DISCHARGE TEMPERATURE FOR VARIOUS OUTDOOR TEMPERATURES

Outdoor Air Temperature .....	0°	15°	20°	30°	40°	50°
Minimum Air Discharge Temperature	80°	74°	72°	68°	64°	60°



Two self-operating pivoted vanes, located within the unit at the outdoor air inlet, gradually restrict the outdoor air opening as wind velocities increase. This exclusive feature prevents excessive quantities of cold air from entering the unit. It not only eliminates the cause of "blow-through" but, since it requires the heating of only the specified quantity of

## AIR VOLUME STABILIZER



outdoor air, it achieves an operating economy not attained by any other unit ventilator.

The cross-section photograph shows the vanes as they hang when there is no wind. MEDIUM WIND: As the wind increases, the vanes swing inward to restrict the volume of outdoor air. STRONG WIND: With higher wind velocities the vanes swing fully to close all but a small fraction of the original outdoor air opening.

*The Nesbitt Syncretizer Unit Ventilator*

# Nesbitt Features

## UNIFORM AIR DISCHARGE

This results from good steam distribution, accomplished by the Nesbitt Radiator through an exclusive feature—Dual Steam-Distributing Tubes—which has revolutionized the control of air-stream temperatures. These tubes, located within each condensing tube of the radiator, evenly distribute the smallest amount of steam over the full length of the radiator whether it is supplying full heat capacity or simply tempering incoming air.



THE NESBITT RADIATOR is constructed of copper headers, copper condensing tubes, dual steam-distributing tubes, and aluminum fins. All connections are silver-brazed. Uniform steam distribution and the location of the radiator away from the outdoor-air intake combine to make the Nesbitt Radiator thoroughly freezeproof.

## MOTOR AND FAN ASSEMBLY

The Nesbitt motor and fan assembly is the simplest known means of powering fans. It is a complete unit, easily handled by one person. Its location is important—*below* the radiator. This permits the easy removal of the assembly. The fans cannot be damaged by children dropping foreign objects through the discharge grilles into the moving blades. The motor is cooled by a constant stream of unheated air; the air stream is heated *after* leaving the fans, expanding as it heats, therefore giving more volume. This results in 10 per cent less work for the fans, lower fan speeds, quieter operation, and lower current costs.

The Nesbitt Syncretizer motor is a quiet-operating, condenser type, with variable speed. From the motor ends extend extra strong solid steel shafts upon which the fans are mounted. This exclusive Nesbitt floating-fan principle has been used in all Nesbitt unit ventilators since 1917. No other present-day unit ventilator has as few moving parts.

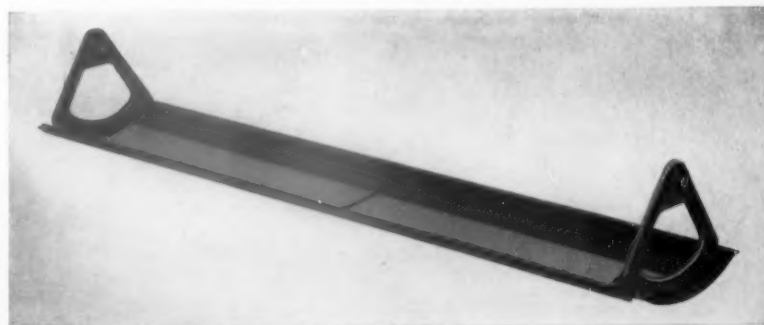


The multi-blade fans vary in number and size in proportionate relation to the capacity of the various sizes of unit. They are constructed entirely of aluminum. Motor and fan speeds are below 700 RPM, an important factor of their extreme quietness of operation. The motor is totally enclosed, resilient mounted, free from brushes or other internal contacts, and non-interfering with radio. The two motor bearings are the only bearings in the entire assembly. The motor requires only one oiling in an entire heating season. Current consumption is exceptionally low, averaging approximately 100 watts per hour for the 1000 cubic feet per minute Syncretizer. All Nesbitt Syncretizers are listed and approved by Underwriters' Laboratories, Inc.

## ONE-PIECE ROLL DAMPER

This has been standard equipment in Nesbitt Syncretizers since 1922. Having but two bronze bearings, it is a marvel of simplicity. Its operation is easily adjustable to meet changing requirements—your guarantee that time will not outmode the Nesbitt Syncretizer.

When automatically controlled, the Nesbitt damper mixes indoor and outdoor air to achieve the maximum fuel economy. Many actual records of coal consumption show substantial savings after the installation of Syncretizers.



# The Nesbitt Syncretizer Unit Ventilator



# Components of The Nesbitt Package

THE NESBITT PACKAGE, first introduced in 1939, is the modern answer to comfort, utility and beauty in the classroom. It combines the healthful comfort of Syncretized Air, the usefulness of roomy storage space, and the chaste, graceful beauty of modern design. Standardization of the units permits combinations to fit the needs of any classroom. The all-steel assembly has a continuous, one-piece metal-bound linoleum display top; smooth round-edge shelving; and black recessed kickplate. Each unit is hard-baked finished in a variety of modern decorators' colors.

## THE NESBITT SYNCRETIZER — SERIES 500

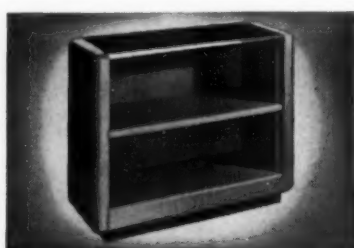
For steam or forced hot water heating systems. Made in four basic sizes, each available in a variety of models. (Described in Section E, Pub. 261.) Table shows capacities and principal dimensions of Type NR (non-recessed) Syncretizer:

MODEL NO.	ANEMOMETER A RATING	LENGTH	HEIGHT	DEPTH	INTAKE WALL BOX
554	750 CFM	59"	32"	14½"	32" x 10⅝"
564	1000 CFM	69"	32"	14½"	41" x 10⅝"
572	1260 CFM	77"	32"	14½"	50" x 10⅝"
580	1560 CFM	85"	32"	14½"	57" x 10⅝"

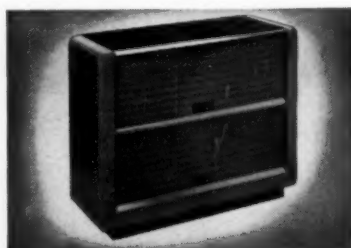
## THE NESBITT AUXILIARY CONVECTOR

Augments heat supplied by the Syncretizer when a greater volume is required. Non-ferrous heating element, bottom feed and return connections. Cabinet is made of 14 gauge furniture steel, welded throughout. Removable front. Available in three sizes, as indicated in table below:

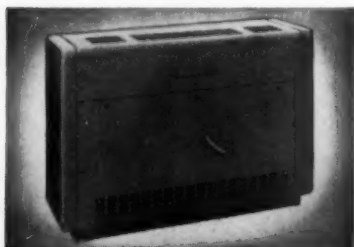
MODEL NO.	CAPACITY EDR	LENGTH	HEIGHT	DEPTH
80 C5	80	47"	32"	14½"
110 C5	110	59"	32"	14½"
140 C5	140	77"	32"	14½"



Nesbitt open storage cabinets are made in several standard lengths.



Made in three-foot lengths, closed cabinets with receding doors, locks.



When desired, a Nesbitt convector may become a unit in the "Package."



Adjustable fill-in sections to make complete wall-to-wall assemblies.

## NESBITT OPEN STORAGE CABINETS

Made of 16 gauge welded furniture steel. All edges formed for added strength. Three sizes:

MODEL NO.	LENGTH	HEIGHT*	DEPTH
24-OS	24"	31¾"	14½"
36-OS	36"	31¾"	14½"
48-OS	48"	31¾"	14½"

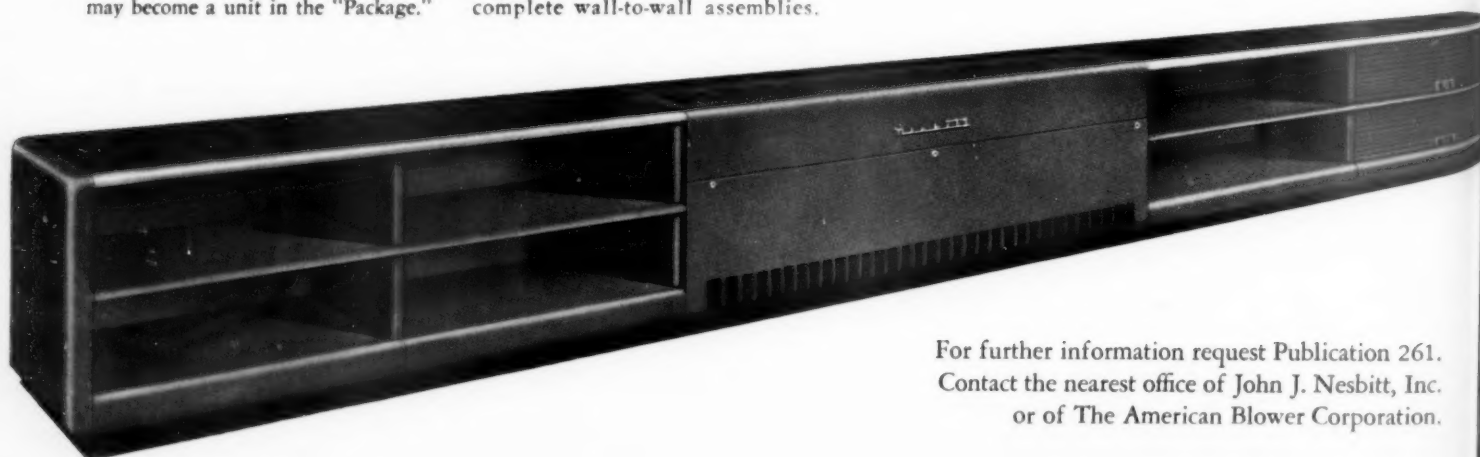
\*Height of unit with linoleum. Height without linoleum is 31⅝".

## NESBITT CLOSED STORAGE CABINETS

Constructed of 16 gauge furniture steel, all-welded. Free-operating, receding doors are lined with ½" sound-deadening material. Provided with individual lock and key. Available in 36" length.

## NESBITT EXTENSION PANELS

Some designers prefer to terminate The Nesbitt Package before the wall is reached. However, where it is desired to fill the entire space from wall to wall, adjustable fill-in sections are provided.



For further information request Publication 261. Contact the nearest office of John J. Nesbitt, Inc. or of The American Blower Corporation.

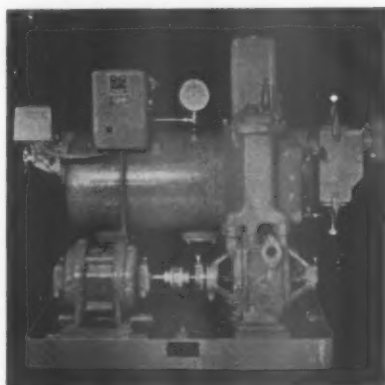
JOHN J. NESBITT, INC., MANUFACTURERS, PHILADELPHIA 36, PA., U. S. A.

# THE NASH ENGINEERING COMPANY

222 Wilson Road

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SALES AND SERVICE OFFICES IN ALL PRINCIPAL CITIES



## JENNINGS RETURN LINE VACUUM HEATING PUMPS

Standard with the heating industry for over sixteen years. Jennings Pumps remove air and condensation from the return lines of vacuum steam heating systems, discharging the air to atmosphere and returning the water to the boiler.

Two independent pumping units are combined in a single casing—an air unit which handles only air, and a water unit which handles only water. The capacity of each unit is simultaneous capacity. Each handles the full rated capacity independent of the other. Impellers of both are mounted on the same shaft. The pump is bronze fitted throughout.

Supplied either direct connected to standard electric motors, for belt drive, or for steam turbine drive. For continuous or automatic operation against pressures up to 40 lbs. Supplied standard in capacities up to 300,000 sq. ft. E.D.R. Bulletins on request.



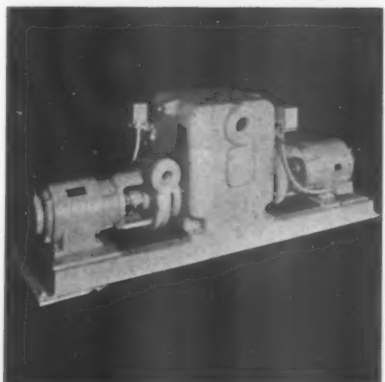
## JENNINGS VAPOR TURBINE VACUUM HEATING PUMPS

The Jennings Vapor Turbine Heating Pump combines all of the advantages of the Standard Jennings Return Line Heating Pumps with a new type of drive, a specially designed low pressure turbine which operates directly on steam from the heating mains on any system, requiring a differential of only 5 in. of mercury, and returns that steam to the heating system with practically no heat loss.

This pump affords the economy which goes with a continuous condensation return and steady vacuum, and at no cost for electric current.

The Jennings Vapor Turbine is a safe heating pump, for it functions as long as there is steam in the system, entirely independent of electric current failure. Ideal for Greenhouse, School, and Hospital service.

Furnished standard in capacities up to 150,000 sq. ft. E.D.R. Bulletin on request.



## JENNINGS CONDENSATION PUMPS

Jennings Condensation Pumps remove condensation from radiators in return line steam heating systems and pump condensation back to the boiler.

Jennings Condensation Pumps are sturdy and compact in construction, and combine receiving tank, pump and driving motor in a single assembly. Bronze fitted throughout, with Tobin bronze shaft. Impeller is of special design adapted to handling hot water with highest efficiency.

They efficiently remove condensation from radiators, particularly those set below the boiler water line level. Pump casing forms part of return tank, making a compact structure that conserves floor space. Rectangular construction permits installation in corner or against wall.

Jennings Condensation Pumps are furnished in standard sizes with capacities ranging from 1½ to 225 g.p.m. of water, for serving from 1,000 to 150,000 sq. ft. equivalent direct radiation. Bulletin on request.



## JENNINGS SUMP AND SEWAGE PUMPS

The Jennings Suction Sump Pump is a self-priming centrifugal pump for handling seepage water and liquids reasonably free from solids. The Suction Sewage Pump is fitted with a non-clog type impeller. Pumps are mounted entirely above the sump where they are always readily accessible. Only the suction pipe is submerged.

There are two moving parts: the centrifugal impeller and the vacuum priming pump rotor. Both rotate without metal-to-metal contact in the casing. Both are mounted on the same shaft that carries the rotor of the electric driving motor, making a compact assembly.

These pumps may be installed away from the pit, or directly over the pit. The Pedestal Type Jennings sets directly on the pit cover, requiring no other foundation.

Capacities and heads to meet all requirements. Bulletins on request.



562

# THE HERMAN NELSON CORPORATION

General Offices and Factories at Moline, Ill.

BRANCH OFFICES AND PRODUCT APPLICATION ENGINEERS IN PRINCIPAL CITIES

## MEETS EVERY MODERN CLASSROOM REQUIREMENT!



**37** points of engineering and functional superiority make it wiser for the buyer to specify . . . **HERMAN NELSON UNIT VENTILATION**

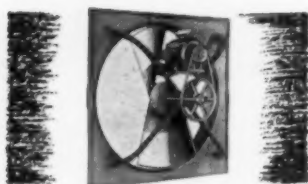
**F**RESH, outdoor air introduced into classrooms, properly mixed with warm air, circulated without drafts or hot blasts, is the function of Herman Nelson Unit Ventilation. Classroom comfort and scien-

tifically controlled temperature are necessary parts of planning for a modern school structure.

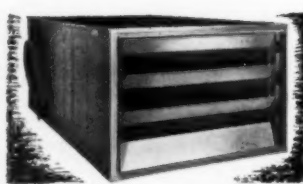
Exclusive, patented features offer uniform distribution of steam within the heating element—no noisy "water hammer", and no by-passing of steam. Direct drive, heavy duty motor propels even-velocity fans. Back draft damper is automatic. Beautiful enamel finish on welded cabinet are construction features. Matching utility cabinets are an economical and extra attractive part of the installation—used apart from, or as a part of the Herman Nelson Unit Ventilator.

Architects who have made close examination say Herman Nelson Unit Ventilators are the finest value, best performer for modern classrooms today. Proof is yours for the asking. Send for catalog—"37 Points of Engineering and Functional Superiority", see for yourself why there is no equal in style or performance. Write to Dept. AD1 at address below.

### *For the Finest in Heating and Ventilating Products*



**HERMAN NELSON PROPELLER FANS**  
Exhausts and changes air in laboratories, kitchens or small shops.



**LARGE CAPACITY VENTILATORS**  
Introduces fresh air in the gymnasium, auditorium or in large, confined areas.



**HERMAN NELSON UNIT HEATERS**  
To heat large areas . . . swimming pools, gymnasiums, auditoriums, locker rooms.



**HERMAN NELSON CONVECTORS**  
Economical heat producer where auxiliary radiation is necessary.



**HERMAN NELSON DIVISION**  
AMERICAN AIR FILTER CO., INC.  
Moline, Illinois



THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



# THE VULCAN RADIATOR CO.

28 Francis Avenue, Hartford 6, Conn.

REPRESENTATIVES IN PRINCIPAL CITIES



**VULCAN HAS NO EQUAL  
In Meeting Desired Standards  
For Modern School Heating Comfort**

TYPICAL MODERN SCHOOLROOM WITH VULCAN INSTALLED BENEATH WINDOWS. CUSTOM-BUILT COVERS

## DRAFT-FREE COMFORT

The radiant heat *plus convection heat* of a Vulcan installation provides an insulating, health-protecting curtain of warm air along cold outer walls and large window areas. Cold air drafts are eliminated, assuring best health standards and comfortable warmth throughout the entire room area.

## QUALITY CONSTRUCTION

Designed for either steam or forced hot water, all Vulcan units are fabricated from first quality seamless steel pressure tube or copper water tube. Fins *guaranteed* to remain tight under conventional operating conditions.

## EASY TO INSTALL

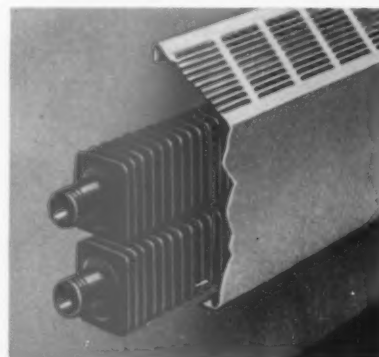
Vulcan is light in weight; requires few fittings and supports. Can easily be installed in either long or short runs in high, low or hard-to-get-at locations. Comes cut to desired length in increments of 1", ends threaded or chamfered for welding.

**Recommended by leading Architects and Heating Engineers**

COMPLETE DATA IN SWEET'S ARCHITECTURAL FILE  
OR SEND DIRECT FOR ILLUSTRATED BULLETIN

## ATTRACTIVE APPEARANCE

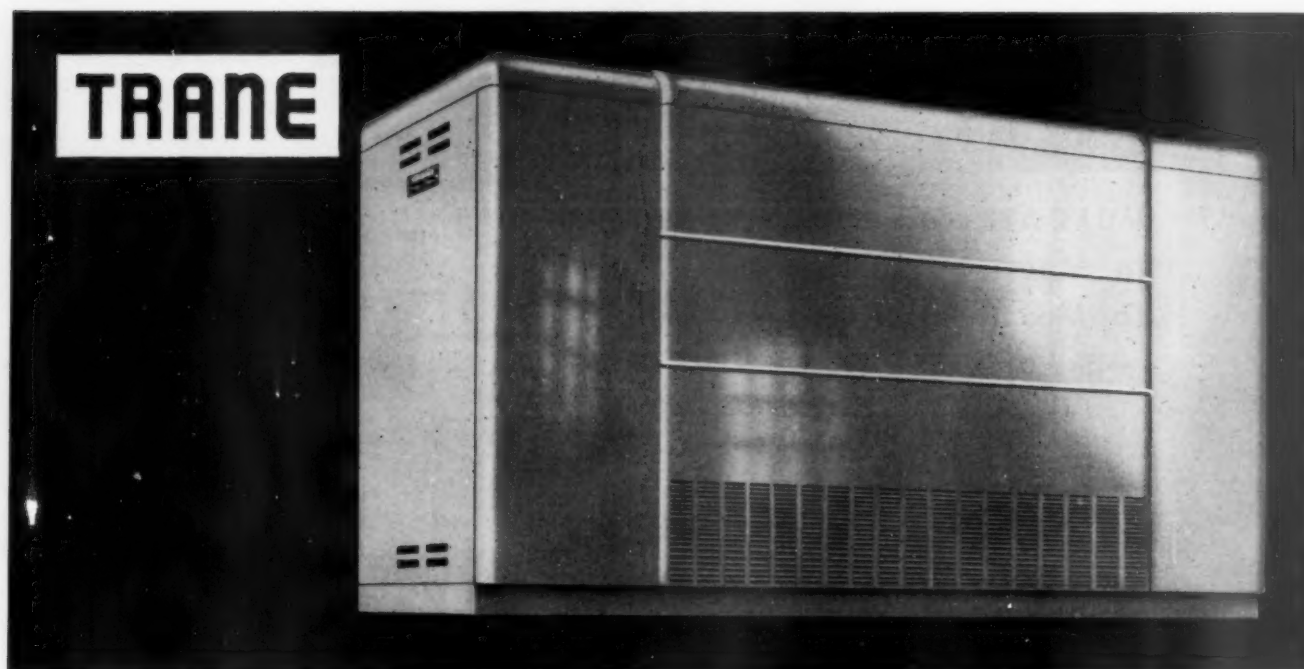
Vulcan Linovector Cover (Type S) shown below is rigidly supported by strong steel brackets, has smooth overall surface, no projections to damage clothing or cause injury. Children can't climb on it or push pencils into it.



THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# THE TRANE COMPANY

La Crosse, Wis.



## Beauty — Comfort — Sturdiness in One Unit Ventilator

In this new model, Trane offers a more sturdy unit ventilator with greater features, at no increase in price. For years, unit ventilators have been built with direct-driven fans. Direct-drive requires highly special motors which are extremely expensive, difficult to get and hard to repair.

### COSTLY MOTORS ELIMINATED

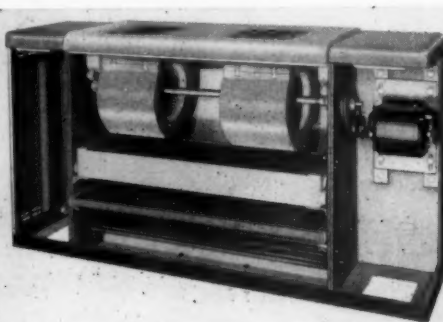
To eliminate such costly motors, Trane product engineers drew on their long experience in the design of unit heating and air conditioning equipment to develop a wholly new and better unit ventilator.

Secret of this outstanding classroom unit is its resilient belt-drive. With this drive, a low-cost, easy-to-buy, easier-to-repair motor is used with even greater efficiency than the old-fashioned direct-connected motor. With motor costs reduced, the designers proceeded to turn this saving back into a better unit ventilator.

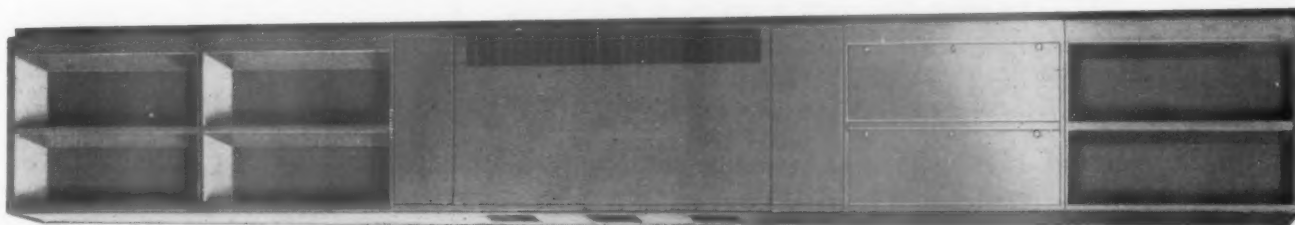
### PROFESSIONALLY DESIGNED CASING

An outstanding designer created a casing with lines so pleasing that it fits every schoolroom decor. Then Trane proceeded to build the casing as rugged as the strongest lad in school. The unit has smaller, easier-to-handle panels so that one maintenance man can do the work of two without additional effort.

A full 1/2" of sponge rubber all the way around the rear panel and fresh air inlet seals out dirt and prevents wall smudging and expensive redecorating. Arrangements for a wide choice of directional flow grilles were made. Space between grille vanes is less than the diameter of a pencil to prevent refuse from collecting in the fan housings. Even the scrubbers were considered—the kick plate was made square to catch mop splashings instead of spreading them over the face of the unit.



THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



### UNIT VENTILATOR MATCHED SHELVING

Matched shelving and supplementary heating units can be combined into a single unit with the Unit Ventilator. Cabinet sections, in many shelving and

storage designs, make the Trane heating and ventilating unit team even better adapted for the school-room.

### NINE GREAT FEATURES

1. **Resilient Belt-Drive**—Eliminates expensive motors—makes more features and better construction possible.
2. **Standard Motors**—With built-in overload protection switch—easy to service, easy to replace.
3. **More Rugged Casing**—Built for the most damaging school-room service—yet pleasingly designed.
4. **Heavier Fan Construction**—Built of heavy metal to stand abuse—damage proof even when stopped forcibly.
5. **Kinetic Orifice Coil**—A "non-freeze" coil with extra capacity without extra size.
6. **Positive Draft Prevention**—Full metal baffle prevents cold outside air from blowing into room through recirculating grille.
7. **Permanent Dirt Seal**—Heavy sponge rubber seal stops outside air dirt even on the roughest walls.
8. **Removable Fan Scroll**—Permits quick cleaning of fan housings.
9. **Small Easy-to-Handle Panels**—One man can remove smaller panels easily for quick low cost maintenance.

### NON-FREEZE TRANE COIL

Inside the unit, there is the famous Trane non-freeze heating coil with the Kinetic Orifice, a feature no other unit ventilator can offer. The Kinetic Orifice distributes steam evenly over the face of the coil, moves condensate out faster and provides greater capacity.

To this is added all the other features of the exclusive Trane solderless, mechanically bonded fin-to tube-to fin type of coil construction. These features provide built in sturdiness, maximum heat transfer, long time operation at full capacity, elimination of damage due to freezing, uniform air distribution and cleanliness.

The heating coil is placed below the fan section to produce a draw-through type of operation. Air to be heated is drawn over the entire area of the coil rather

than being forced through a small part of it. This method is preferred by most leading engineers, improves performance, prevents spotty heating and is more economical.

### HEAVY FANS AND SHAFTS

In the fans and shafts, Trane uses extra heavy metals. Fans are built to stand abuse. Front panel of the fan housing can be removed to simplify cleaning. Dampers are heavier. Dampers are mounted high in the unit to prevent snow and sleet from hindering operation. Filters are divided for easier maintenance. A full baffle between outside and recirculated air inlets kills drafts before they start.

For further details contact the nearest Trane Sales Office or write for Bulletin DS-340.

### THE TRANE COMPANY

### LA CROSSE, WISCONSIN

#### MANUFACTURING ENGINEERS OF

Heating  
Ventilating and Air Con-  
ditioning Equipment  
Unit Heaters

Convactor-radiators  
Heating and Cooling Coils  
Fans

Compressors  
Air Conditioners  
Unit Ventilators

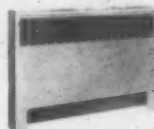
Special Heat Exchange  
Equipment  
Steam and Hot Water  
Heating Specialties

In Canada: TRANE COMPANY OF CANADA, LTD., Toronto

### RELATED TRANE PRODUCTS

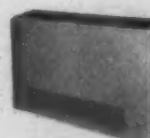


**Large Ventilating Units**  
To supply fresh air for auditoriums and gymnasiums. Large capacity units in a wide range of sizes.

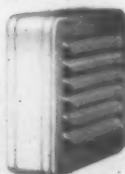


**Convactor-radiators**  
Modern successor to the radiator, the convactor-radiator is an ideal supplementary heating unit in the schoolroom.

**Force-Flo Heaters**  
A compact unit heater in a deluxe casing delivers quantities of heated air from a single source.



**Propeller Unit Heaters**  
A horizontal propeller type unit that combines a host of new features into a sturdily constructed casing.



**Traps and Valves**  
Use Trane Traps and Valves with Trane Unit Ventilators and get the added advantage of matched products.



**Projection Unit Heaters**  
A vertical down-blow unit for high or low ceilings now available with a completely adjustable diffuser.



# WARREN WEBSTER & COMPANY

Established 1888

Home Office and Factory: 1655 Federal Street, Camden 5, N. J.

Manufacturers of Heating Systems and Heating System Equipment • Traps • Valves  
Steam Heating Specialties • Heating Controls • Convactor Radiation • Baseboard Heating

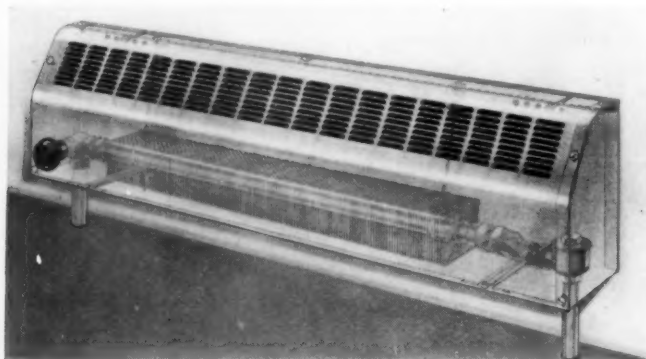
## WEBSTER WALVECTOR For Steam or Hot Water Heating

Webster Walvector is the latest development in Webster heating system equipment to find an important place in Webster Heating Systems, both steam and hot water, for public and private school installations.

Introduced only two years ago in a limited way, Webster Walvector has already been installed in new school buildings, in additions to existing school buildings and in modernization of obsolete and outworn heating systems in existing schools in more than 30 states from Florida and Alabama to Massachusetts and New York; and from Texas and California and the State of Washington.

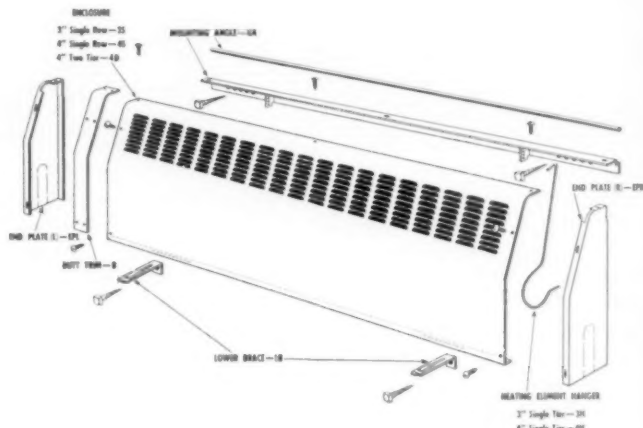
Webster Walvector is modern direct radiation.

Unlike old style radiation, Webster Walvector is light in weight. Also, unlike older types of direct radiation—and even most present-day conventional convectors—Webster Walvector is designed to *spread the heat* evenly over the entire length of the exposed or cold wall.



Webster Walvector in phantom view showing 12½-inch high Enclosure and 4-inch fin type "W1" Heating Element. Enclosure is 4 feet 4½ inches long. Heating Element is 3 feet long with adapter ends. Webster ¾" Supply Valve, corner body type, and Webster ½" Radiator Trap with offset adapter for steam heating installation

Webster Walvector is made of copper tube with aluminum fins. It is provided with a strong stamped steel cover.



Exploded view of Webster Walvector showing component parts and symbol for each

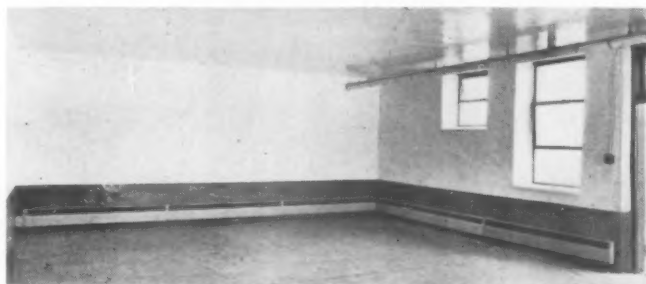
Webster Walvector can be used either as a separate unit or for wall-to-wall installation. It can be installed close to the floor or at any desired elevation between floor and windowsill.

TABLE I—BASIC RATINGS OF WEBSTER WALVECTOR BASIC RATINGS INCLUDE HEATING EFFECT FACTOR

FIN SIZE	STEAM Based on 1 lb. Steam, 65° Entering Air	HOT WATER Based on 200° Water Temperature, 65° Entering Air, 2.0 ft. per Second Velocity
	Sq. Ft. E. D. R. per Lin. Ft.	B. t. u. per Lin Ft.
3" Single Row, No Enc.	5.0	1,085
4" Single Row, No Enc.	7.25	1,630
3" Single Row, 11" Enc.	5.9	1,290
4" Single Row, 12½" Enc.	8.25	1,850
4" Single Row, 20" Enc.	9.7	2,180
4" Double Row, 20" Enc.	11.35	2,550



View of Lawncrest Recreation Center, Philadelphia, Pa., showing Webster Walvectors mounted under windows



St. Robert's School, Chester, Pa., a parochial school, found in Webster Walvector the answer to the problem of how to convert an unheated basement room into an additional classroom. Webster Walvector installed on two walls heats this added room without change in the main steam heating plant. Hot water is supplied to the Walvector through a heat exchanger. This modernization was carried out by Contractor John A. Morgan, of Chester, who obtained the Webster Walvector through Desco Corp., well known Chester jobbers

Webster Walvector is safe as the steam-containing portions (in steam heating installations) is inside the metal enclosure so that there is no exposed part hot enough to burn or even to be uncomfortable to children who may touch it.

Webster Walvector provides great heat output within a given space, thus meeting the requirements of the coldest climates. Where heating requirements are limited, the heating elements of Webster Walvector can be so spaced as to spread the heat over the entire outside wall.

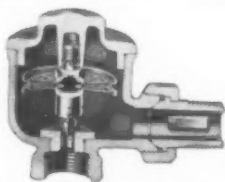
Special design features in Webster Walvector assure clean heating. A sponge rubber gasket, fastened in the mounting angle, thoroughly seals the space between the enclosure and the wall, *even if there are wall irregularities.*

Webster Walvector is easy to install. The mounting angle is part of the assembly. Webster service details show the simple method of installation.

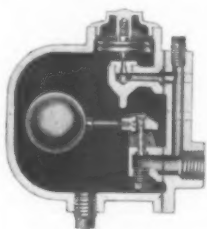
The heating element in Webster Walvector is Webster Type WI Radiation. Choice of single or double row, 3" or 4" size. Three sizes of enclosures available. Complete rating data is listed in table at bottom of facing page.

For additional information on prices and deliveries of the Webster Walvector, get in touch with your nearest Webster Representative. Write us for his address.

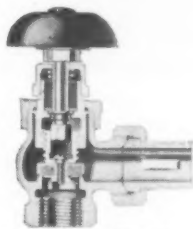
## OTHER WEBSTER HEATING EQUIPMENT AVAILABLE FOR SCHOOLS



Webster 702H Thermostatic Trap



Webster Heavy Duty Drip Trap, Size 00026-T



Webster Series 600P Valve

**WEBSTER THERMOSTATIC TRAPS . . .** Series "7" (diaphragm type) and Series "5" (bellows type) for radiators and drips.  $\frac{1}{2}$ ",  $\frac{3}{4}$ " and 1" sizes. Maximum pressure, 25 lbs. per sq. in. For low pressure vapor and vacuum steam heating service.

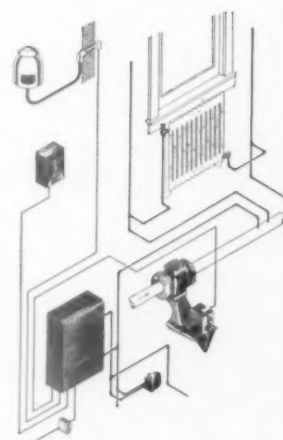
**WEBSTER HEAVY DUTY OR DRIP TRAPS . . .** Series "26" Float and Thermostatic. Three sizes. Pressures to 15 lbs. per sq. in. For use where large volumes of hot condensate must be handled more quickly than is possible with thermostatic traps alone.

**WEBSTER RADIATOR VALVES . . .** Choice of spring-retained packing. Type WB-P or Syphon Bellows Packless Series 600-S.  $\frac{1}{2}$ ",  $\frac{3}{4}$ ", 1" and  $1\frac{1}{2}$ " sizes. In angle, right and left hand; straight-way, with single or double union. Spring retained packing. For vapor and vacuum steam heating and for hot water service.

**WEBSTER MODERATOR SYSTEMS . . .** Moderator Controls, together with accurately sized metering orifices in radiators of two-pipe vacuum or vapor steam heating system include an Outdoor Thermostat, a Variator for manual control, a Pressure Control Cabinet and a Motorized Steam Valve.

**WEBSTER BASEBOARD HEATING — True Perimeter Heating . . .** A patented forced circulation hot water heating system in which the heating element fits behind a specially built metal baseboard. Air enters at floor line, passes over finned heating element, is warmed and comes out of slots at the top of the baseboard. Heating element is a copper tube with copper fins running in a continuous loop around the exposed walls of the building — a separate loop for each floor.

**WEBSTER CF-2 HOT WATER HEATING CONTROL . . .** Applies continuous heating principles of Moderator Control to hot water heating.



Standard Arrangement of Webster Electronic Moderator System using a single Main Steam Control Valve

# JOHNSON SERVICE COMPANY

Milwaukee 2, Wisconsin  
BRANCHES IN ALL PRINCIPAL CITIES

## Temperature Control Equipment

**FOR  
MODERN SCHOOL  
AND  
COLLEGE BUILDINGS**

*by Johnson*

There are three general methods of heating and ventilating modern school buildings. In order that all the elements which enter into these systems may be correlated properly and function in correct sequence, it is essential that a complete, unified system of automatic temperature control be installed, as developed by Johnson. No unrelated collection of devices sold "over the counter" and installed by mechanics not familiar with the type of work, will give satisfaction.

### 1. THE COMBINATION OR "SPLIT" SYSTEM

Heating consists of direct radiators and convectors, generally of sufficient size to offset the heat loss from the exposed wall and glass surface. Ventilation requirements are met by indirect radiation of sufficient capacity to warm the air, which is delivered by the duct system.

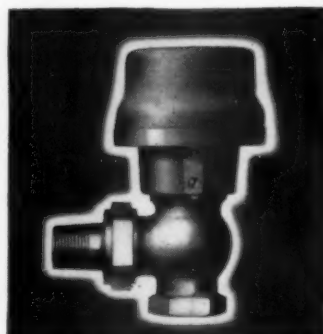
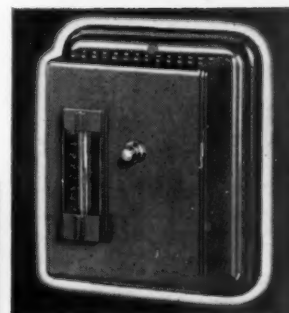
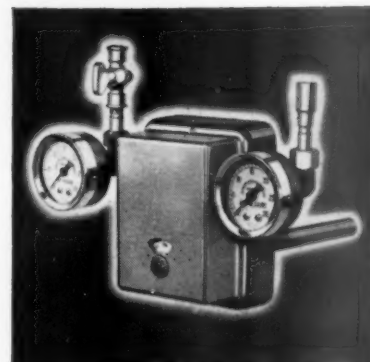
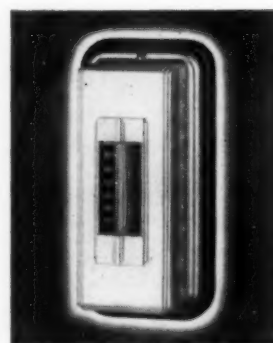
### 2. "UNIT" SYSTEM

Convectors or direct radiators partially offset the heat loss from the exposed wall and glass surface, and an indirect radiator in the unit ventilator furnishes the additional heat necessary and provides for ventilation requirements.

### 3. BLAST OR "INDIRECT" SYSTEM

A mixture of outdoor and return air is drawn into the combined heating and ventilating system and then forced through automatically controlled heating coils or tempered air by-pass into warm and tempered air chambers. Double Mixing Dampers in the individual duct to each room are controlled by a room thermostat, insuring the proper temperature for each space.

All of the requirements for automatic control of these systems have been carefully worked out by Johnson. Write for booklet with detailed descriptions and illustrations of the three methods of heating and ventilation in modern schools.



THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



*The Wise  
School Executive Selects*

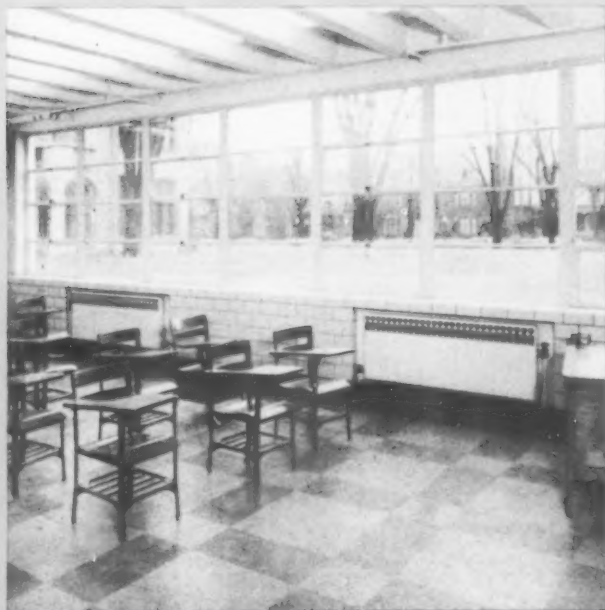
# AIReATED RADIANT HEAT

produced by

**SHAW-PERKINS PANEL RADIATORS**

makes possible

## INDOOR CLIMATE CONTROL DURING THE HEATING SEASON



Shaw-Perkins Panel Radiators combine two of nature's basic elements—warm circulating air and mild radiant heat rays—in EXACT ENGINEERED PROPORTIONS to produce activated, vitalized heat which permeates the entire room.

Air is heated in each section of Shaw-Perkins panel radiators by the full length rigid steel plates which are positively bonded to the copper tubing containing the steam or hot water. The side walls of each section are also positively locked to the copper tubing and conduct heat directly to the radiant panel. This unique construction assures the exact engineered proportion of warm circulating air and mild radiant heat rays which is the foundation of AIReATED RADIANT HEAT.

When AIReATED RADIANT HEAT is installed it brings more than just comfort, it creates a Controlled Indoor Climate—a delightful indoor climate which contributes greatly to health, well being, and efficiency.

*All Performance*

### PANEL RADIATORS

Shaw-Perkins Panel Radiators will function effectively on hot water systems, low pressure steam or vapor systems, high temperature water systems, and high pressure steam systems.

*Adaptability*

### UNLIMITED

Shaw-Perkins "all purpose" Panel Radiators can be wall hung, free standing, recessed, or ceiling mounted. Adaptability of Shaw-Perkins Panel Radiators is greatly increased by corner and baseboard models as illustrated.

**SHAW-PERKINS MANUFACTURING CO.**

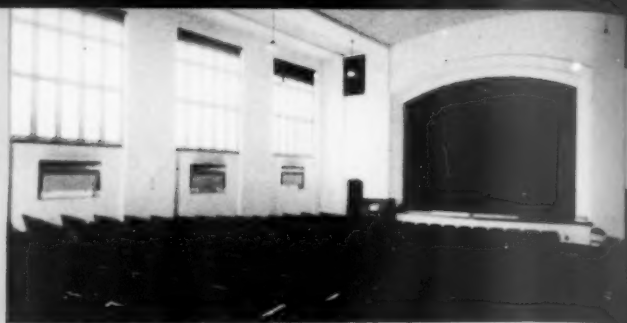
**201 EAST CARSON STREET • PITTSBURGH 19, PA.**

PIONEERS IN THE DEVELOPMENT OF HIGH CONVECTION RADIATORS





Shaw radiator model A wall hung installed in school corridor.



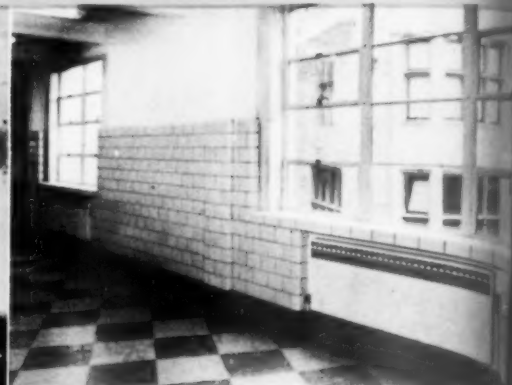
Shaw radiator model A open recess installed in school auditorium.



Perkins radiator wall hung installed in classroom.



Shaw baseboard radiator installed in classroom.



Shaw radiator model A open recess installed in school corridor.

## SHAW-PERKINS complete line provides a panel radiator for every heating problem

### WALL MOUNTED PANEL RADIATORS

Shaw-Perkins Panel Radiators are designed to give maximum performance when mounted fully exposed on the wall. Only three inches deep, they occupy a minimum of space thus leaving freedom for furniture arrangement. The paneled surface and attractive design blend easily and beautifully with any scheme of interior decoration.

### CEILING MOUNTED RADIATORS

Perkins AIRATED HEAT radiators are specially designed to meet the problems of large area or large room heating. They may be wall mounted or ceiling mounted. When ceiling hung, Perkins AIRATED Heat radiators give unequalled performance and assure real heating comfort free from dirt, dust, hot blasts, cold drafts, and noises.

### CORNER RADIATORS

Shaw-Perkins Panel Corner Radiators, a distinct innovation in modern heating equipment, are designed to meet difficult heating problems involving corner windows or situations in which it is necessary to carry out smooth, connected lines between radiators on adjacent walls.

### BASEBOARD RADIATORS

Shaw-Perkins Panel Baseboard Radiators are designed to solve specific heating problems. The unique sectional construction and distinctive appearance characteristic of Shaw-Perkins panel radiators are retained in Shaw-Perkins baseboard radiators. The strength built into all Shaw-Perkins radiators enables Shaw-Perkins baseboard radiators to withstand rough treatment and abuse to which radiators in the baseboard location may be subjected. The high output of AIRATED RADIANT HEAT produced by Shaw-Perkins baseboard radiators makes possible Indoor Climate Control during the heating season.

### RECESSED RADIATORS

When it is necessary or desirable to recess, Shaw-Perkins Panel Radiators greatly simplify the installation. They can be mounted in shallow open recesses without loss of efficiency, or piping may be covered by flush panels. Three section flush panels are furnished which are removable without the use of tools for servicing enclosed valves or traps. The benefits of AIRATED RADIANT HEAT are retained when Shaw-Perkins panel radiators are recessed.

## AIRATED RADIANT HEAT SETS NEW HIGH STANDARDS

AIRATED RADIANT HEAT, with Shaw-Perkins panel radiators, sets new high standards in quality heating—standards which are supported and recommended by leading Architects and Engineers. Only Shaw-Perkins panel radiators produce AIRATED RADIANT HEAT in its most practical form. The many heights, lengths, and models of Shaw-Perkins panel radiators make it possible to select and to cover with one specification the correct Shaw-Perkins unit for any heating requirement from one catalog—one set of heating tables, one source—one company, retaining the same basic appearance, factory assembled quality construction, time-tested design, and AIRATED RADIANT HEAT. Every Shaw-Perkins installation expresses "the professional touch".

FORM G 18M-50

For further information, send for our catalog "MODERN RADIATION"

**SHAW-PERKINS MANUFACTURING CO.**  
201 EAST CARSON STREET • PITTSBURGH 19, PA.

PIONEERS IN THE DEVELOPMENT OF HIGH CONVECTION RADIATORS



# AMERICAN ROOFLIGHTS



**metal skylights**  
**stage ventilators**

***LIGHT UP . . . The AMERICAN Way!***

**AMERICAN 3 WAY-LUXFER PRISM CO.**

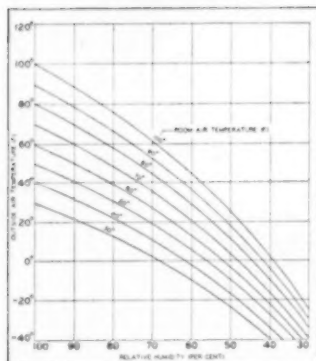
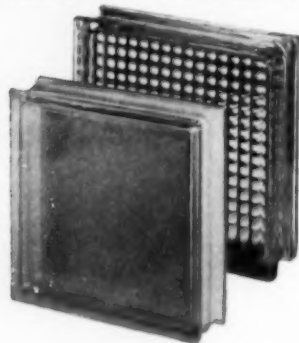
431 S. Dearborn St., Chicago 5, Ill.

26-20 Jackson Ave., Long Island City 1, N. Y.



# AMERICAN ROOFLIGHTS

## NATURAL DAYLIGHT SCIENTIFICALLY DISTRIBUTED



Outdoor Temperatures Required to Produce Condensation on the Underside of Standard Glass Block Rooflights

## THERMAL INSULATION

Tests conducted by methods suggested by the American Society of Heating and Ventilating Engineers Code show that Glass Block Rooflights have about two and one-half times the insulating value of sheet metal skylights. In computing heat losses through Glass Block Rooflights, it is recommended that a "U" value of 0.46 to 0.49 be used.

## CONDENSATION

Due to the design and construction of the supporting grid in which the glass blocks are sealed and where insulating materials are given full employment, condensation will not start forming on the underside of Glass Block Rooflights until outside air has reached a temperature considerably lower than that necessary to produce condensation on metal skylights.

The accompanying chart shows under what conditions and at what temperatures condensation will form on the underside of Glass Block Rooflights. As the chart indicates, with room air at 70° F. and relative humidity at 40 per cent, condensation will not start forming on the underside of Glass Block Rooflights until the outside air temperature drops to -14° F. Under similar conditions, with the average sheet metal skylight, moisture will form on underside of glass when outside temperature drops to +33° F.

NOTE: When special conditions so require, additional insulating features may be incorporated which will considerably improve the "U" value.

Structures of every kind become better working-units with the addition of glass block roof lighting, especially ideal for use in the many new types of air conditioned buildings.

## CONSTRUCTION

American Glass Block Rooflights use specially designed semi-vacuum glass blocks, 9" square, 2½" thick, set in a 3¾" thick reinforced concrete grid. Each glass block is sealed in place with permanent Tee-Ess Compound applied in fluid form at approximately 280° F., insuring a homogenous, weather-proof seal. Non-ferrous metal reglets are set and anchored in the reinforced concrete grids around the outer rows of glass blocks. The reglets provide arrangements for weather-tight flashing connections with any type of roofing as per standard flashing detail. When all expansion joints between panels, as well as the borders on margins of panels, have been properly flashed as directed, there are no concrete surfaces exposed to the elements; the entire rooflight area becomes weatherproof, dustproof, vaporproof and air-tight. The panels will support ordinary roof loads and may be walked upon to clean the glass.

Where extreme conditions warrant or require them, special insulating materials can be incorporated. Contact our Sales Engineering Department for information concerning your particular problem.

## TWO DESIGNS OF GLASS BLOCKS ARE AVAILABLE

American Skylight Blocks are made of water white crystal glass. Light diffusing elements are incorporated in the inner horizontal surfaces leaving the top and bottom surfaces smooth and easily cleaned.

No. 42-P Glass Block has an overall sleet finish providing a soft overall general diffusion, ideal for office or classrooms.

No. 91-M Glass Block uses the familiar quilted pattern, the scientifically designed lenses transmitting a maximum of daylight with wide diffusion.

## AMERICAN ROOFLIGHTS MAY BE PURCHASED IN 3 WAYS

- (1) Shipped in factory finished slabs with glass block units in place, all ready to set over roof openings, maximum slab size, 4 rows of seven blocks, each 4'3" x 6'10¾" or approximately 28 square feet.
- (2) Shipped as factory finished grids with glass block units omitted and shipped separately, with necessary Tee-Ess setting compound included; maximum grid size: 5 rows of seven units, each 5'2" x 6'10¾" or approximately 35 square feet.
- (3) Poured in place at job site; maximum area: each panel 8 rows of twelve glass units or approximately 85 square feet.

Following any of the above methods, large areas consisting of any number of panel units may be used. Proper supports or bearings must be provided to support the slabs, as per structural details and data. Approximate weight 40 pounds per square foot.

## FACTORY FINISHED PANELS EASILY INSTALLED AND MOST ECONOMICAL

When not exceeding 28 square feet in area, individual panels of glass block rooflights may be factory finished—shipped with glass blocks sealed in place. Installation is simple—hoist them to roof, remove crating and place the panels on the curbs or over openings provided.

The roofing or sheet metal contractor must then furnish and apply flashings as directed and the installation is complete.

When reinforced concrete grids and glass blocks are shipped separately, the same procedure is followed, only the glass blocks must be set and sealed in place, using the special compound furnished, before flashings are applied.

## GLASS BLOCK ROOFLIGHTS AID AIR-CONDITIONING

Good clean air and temperature control, perhaps the two principal objectives of air-conditioning, are aided by the use of Glass Block Rooflights. During summer months there will be considerable less heat gain as compared with metal skylights and no dirt or dust. When cold winter days come along the tightly sealed panels form a perfect barrier against drafts from without, reduce heat loss from within, and provide complete protection against vapor.

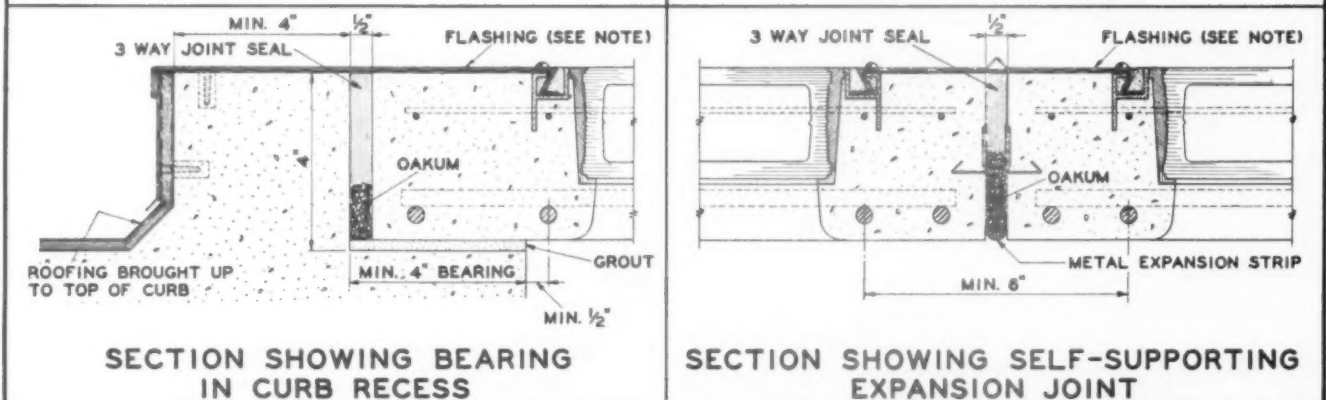
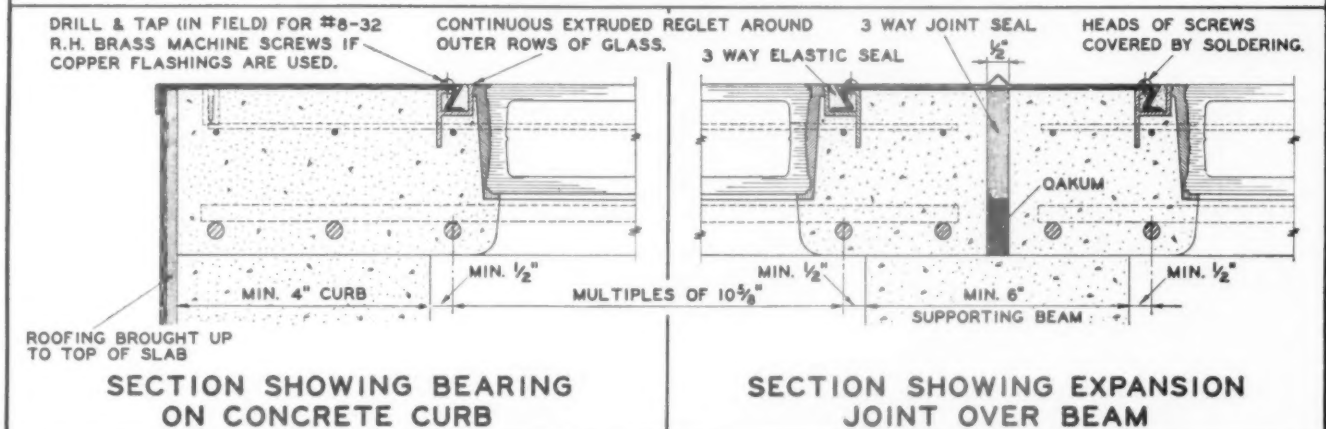
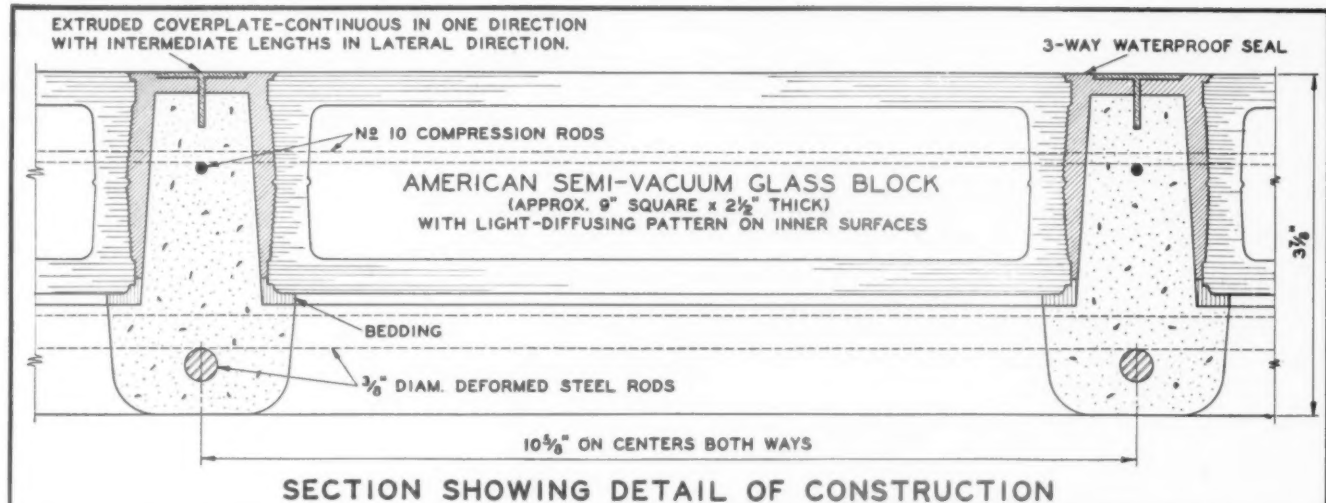
## EASILY CLEANED—GUARANTEED

We guarantee American Rooflights against defects in material and workmanship applicable to all such materials and labor as we may furnish in connection with a glass block rooflight installation. Upon due notice and proof of defects within a five year period from date of guarantee, we will make necessary repairs or replacements without cost to the owners.

## SUGGESTED SPECIFICATION

This contractor (mason or sheet metal) shall furnish and set roof-light panels as shown using No. 42-P (or No. 91-M) Semi-Vacuum Glass Blocks, approximately 9" square, 2½" thick at 10½" centers as manufactured by the American 3 Way-Luxfer Prism Company. After panels are set on curbs or in openings provided, flash with two layers of mopped membrane, flashing as shown and called for in manufacturer's standard details.

## STRUCTURAL DETAILS AND DATA



### STRUCTURAL DATA

**MAXIMUM PANEL SIZES:-**  
 FACTORY GLAZED PANELS:  
 4 UNITS BY 7 UNITS OR APPROX. 28 SQ. FT. AREA.  
 FACTORY FINISHED GRIDS (GLASS SET AT JOB SITE)  
 5 UNITS BY 7 UNITS OR APPROX. 35 SQ. FT. AREA.  
 MONOLITHIC PANELS (CONSTRUCTED AT JOB SITE):  
 8 UNITS BY 12 UNITS OR APPROX. 85 SQ. FT. AREA.

**MAXIMUM SPAN BETWEEN SUPPORTS:**  
 WIDTH-NOT OVER 7'-2".  
 LENGTH-UNLIMITED (USING SELF-SUPPORTING JOINTS)

**MINIMUM PITCH:-**  
 PROVIDE FOR MINIMUM 1/4" TO 12" PITCH.

**WEIGHT PER SQ. FT.:-**  
 APPROX. 35-40 LBS. (GLAZED)

**LIVE LOAD:-**  
 40 LBS. PLUS PER SQ. FT.

### NOTE:-FLASHINGS-

FLASHINGS CONSISTING OF 2 PLIES MEMBRANE FABRIC CEMENTED TO CONCRETE SURFACES WITH HOT ASPHALT MOPPING BETWEEN PLIES AND ON OUTER SURFACES TO BE FURNISHED AND INSTALLED BY ROOFING OR SHEET METAL CONTRACTOR.  
 IF DESIRED, MEMBRANE FLASHINGS MAY BE COVERED WITH 16 OZ. LEAD-COATED COPPER AS SHOWN IN DETAILS ABOVE.

### SCHEDULE OF UNIT MULTIPLES AT 10 5/8" CENTERS

1 = 0'-10 3/8"	4 = 3'-6 1/2"	7 = 6'-2 3/8"	10 = 9'-10 1/4"
2 = 1'-9 1/4"	5 = 4'-5 1/8"	8 = 7'-1"	11 = 9'-8 3/8"
3 = 2'-7 7/8"	6 = 5'-3 3/4"	9 = 7'-11 1/8"	12 = 10'-7 1/2"

**AMERICAN  
3 WAY-LUXFER PRISM CO.**

DAYLIGHT ENGINEERS  
CHICAGO NEW YORK

AMERICAN GLASS BLOCK ROOFLIGHT CONSTRUCTION

**PLATE**

**T45-2**

REVISED  
2-1-50.

# Daylight School Classrooms and Corridors with

## BETTER CLASSROOM DAYLIGHTING

Due to the character of schoolroom instruction, the matter of rapid, accurate and easy "seeing" plus eye comfort should have first consideration.

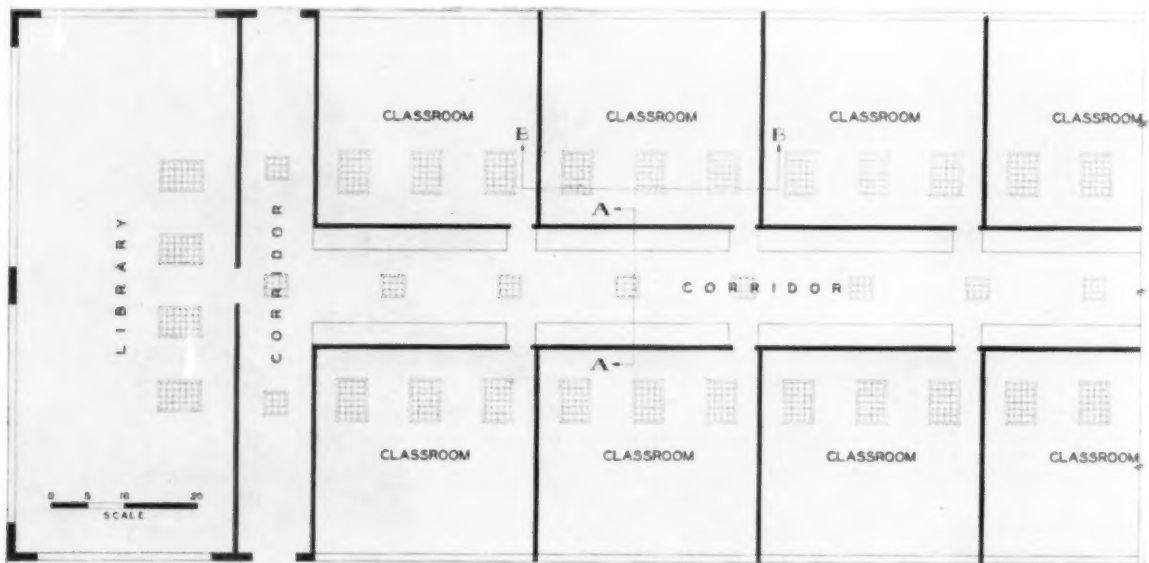
Natural daylighting for lower floor rooms of multi-story buildings must necessarily come from sidewall sash. Daylight from sidewall sash or Glass Block Panels has improved considerably but still has its limitations.

It is generally agreed that the best source of natural light is from above. American Rooflights are the ideal medium to transmit and distribute natural light to a school classroom.

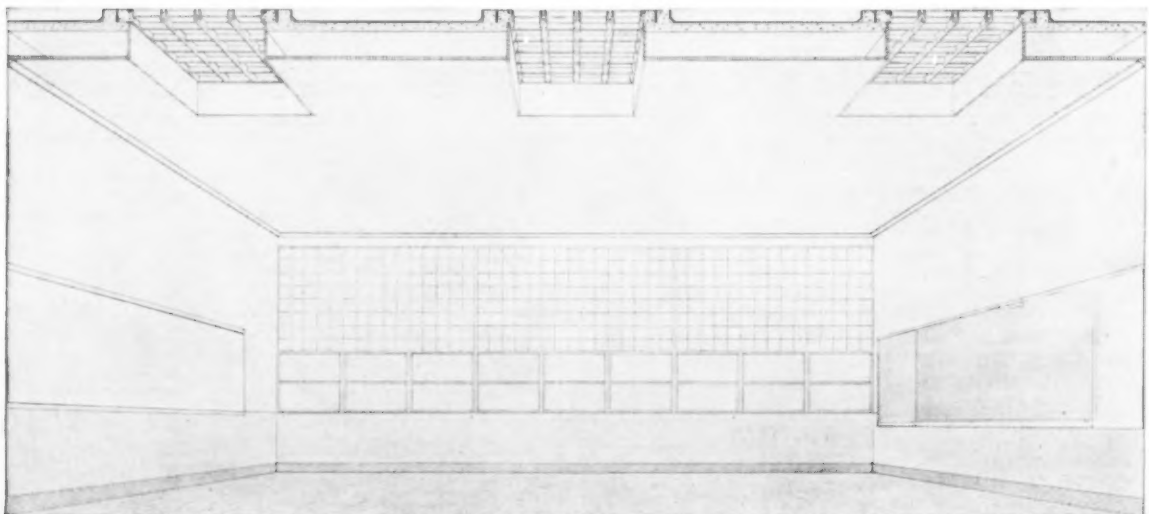
Classrooms in one story buildings or on the top floors of multi-storied buildings may be almost perfectly daylighted either by a combination of sidewall daylighting mediums and rooflights or by rooflights only. Placed over the interior area of a school classroom, rooflights will transmit an abundance of soft, healthful daylight. The whole room will be cheerful, bright and attractive with "dark spots" eliminated and walls and blackboards properly lighted for rapid, accurate and easy "seeing." See accompanying sketch, plan and illustrations of actual installations.



Note ideal, evenly distributed daylight over entire classroom.



TYPICAL PLAN—Wing of modern one-story school with an excellent arrangement of American Rooflights over rooms and corridors to provide the ultimate in efficient and economical daylighting.



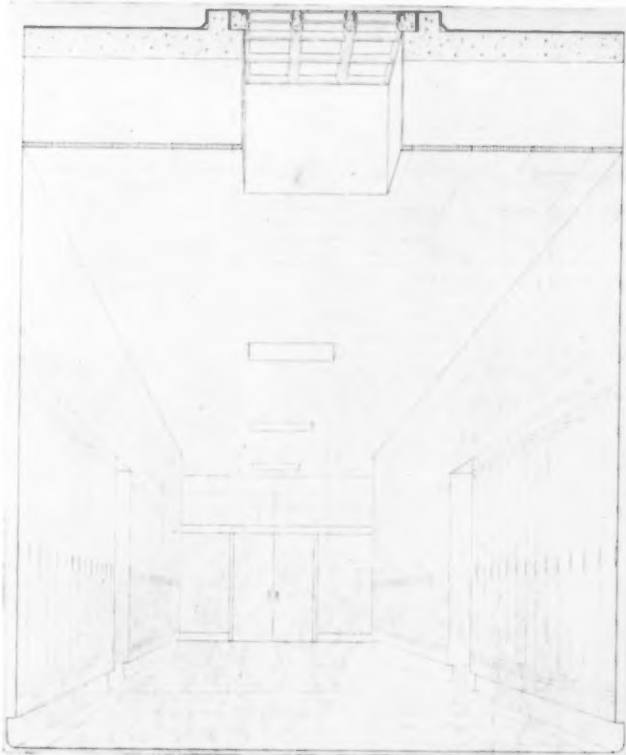
VIEW THROUGH CLASSROOM (Plan section B-B).



## AMERICAN Rooflights



Three panels of American Rooflights on a Chicago Public School



VIEW THROUGH CLASSROOM (Plan section B-B).

## SKYLIGHTS | concrete grid diffusing glass

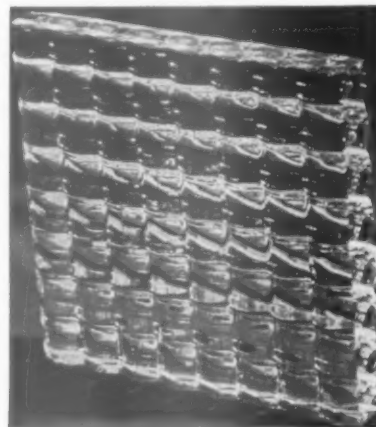
### MAGNALITE DIFFUSING GLASS



Wm. T. Aldrich, Architect—Courtesy, Boston Museum of Fine Arts

#### CEILING LIGHTS

MAGNALITE forms a perfect screen and hides all superstructure and lighting equipment, thoroughly diffusing the light from artificial sources as well as daylight. MAGNALITE Type "B" wired widely used for this purpose.



MAGNALITE "B"

#### DESCRIPTION AND SPECIFICATIONS

MAGNALITE is a figured rolled sheet Flint Glass with specially designed cylindrical lenses on each surface, running at right angles to each other. There are two types:

MAGNALITE "A" is made with the lenses approximately  $\frac{1}{2}$ " on centers. Plain— $\frac{1}{4}$ " thick.

MAGNALITE "B" is very similar to MAGNALITE "A," except in the size of the cylindrical lenses. The MAGNALITE "B" lenses are approximately  $\frac{1}{4}$ " on centers. Plain— $\frac{1}{4}$ " thick. Wire glc.s — $\frac{1}{4}$ " thick.

#### USES

Skylights  
Doors

Ceiling Lights  
Screens and Partitions

MAGNALITE "A" is recommended for general use and decorative purposes in all types of buildings. MAGNALITE "B" is recommended for strictly functional purposes and where glass sizes are small and close to vision.

#### DISTRIBUTION

MAGNALITE is distributed by the American 3 Way-Luxfer Prism Company, and is sold by leading glass dealers everywhere.

## AMERICAN TYPE "J"

## A Skylight that Ventilates

Millions of square feet of installations and an increasing volume of repeat orders on all types of industrial, commercial and educational buildings in every section of the country attest the continued popularity and dependability of American Type "J" Ventilating Skylights.

By establishing standard stock widths (see table below) and effecting quantity production, it has been possible to produce these high grade skylights at remarkably low cost. Stock sizes, ventilating full length, may be purchased for very little if any more per square foot than the average stationary or fixed skylight.

For food processing plants, we recommend openings be protected by built-in insect screens, easily removable for cleaning. These screens are available at small additional cost.

Motor operating equipment may be applied to standard brake type operators.

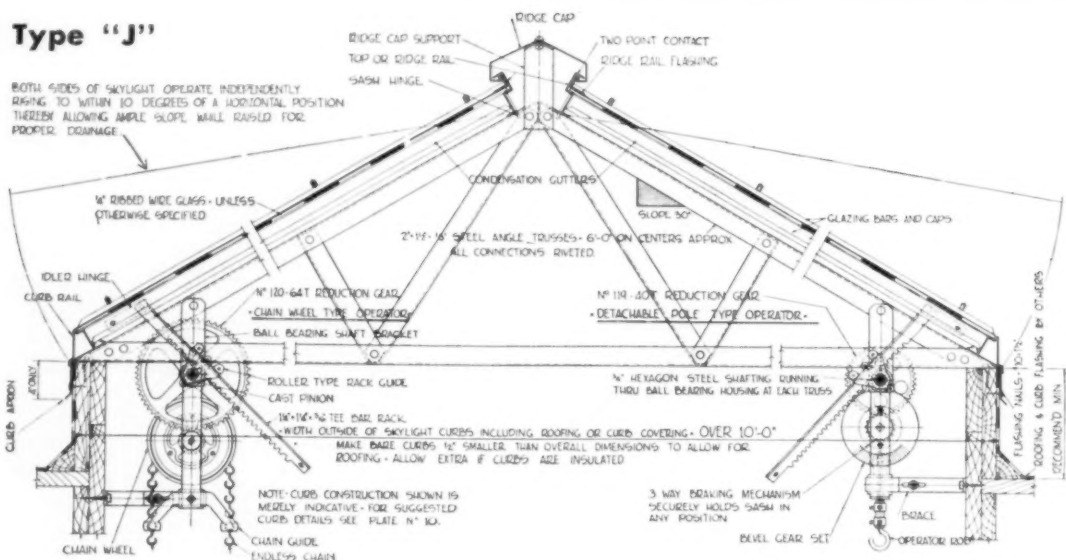
Write for details on our complete line of ventilating skylights and accessories.



### Detail of 12 Ft. Type "J" Skylight

#### VERY IMPORTANT

Our skylights are made to fit an overall curb size including curb covering, so if curbs are covered with roofing or insulating material allow for the thickness of this material in determining the overall dimensions of the curb you furnish to receive these skylights.



#### SPECIFICATIONS

All sash members, ridge and gable ends are formed of #18 gauge tite-coat galvanized copper bearing steel. Curb apron is formed of #24 gauge tite-coat galvanized copper bearing steel. (For gauges in aluminum and copper see table below.)

The sash is assembled without the use of solder; cleated together in such manner as not to expose the cleats to the weathering surface. Ample provision is made for carrying away condensation which may be delivered from the underside of the glass. The sash is supported on steel trusses, properly designed for the span involved and spaced approximately six feet on centers.

The ventilating sections are equipped with rack and pinion type operating mechanism using solid hexagonal steel shafting and roller pinions. Brass ball races with hardened steel ball bearings contained in dust tight brass housings are provided at each truss. Racks are steel tee sections, held in close contact with the pinions by roller guides. The racks are not attached directly to the sash but to a sash hinge, designed to equalize the load and prevent uneven strain on any one sash bar.

Operators are "3-Way" brake and release type, one for each ventilating section, controlled from the floor with detachable crank handle. (Same operator with endless chain control optional.) All operating gears are high grade close grain machine castings.

All ferrous metal parts are given a coat of specially prepared paint at the factory.

Glazing—(specify type of glass desired).

The glass is bedded in a good grade of steel sash putty. The putty is protected with a cap secured to the glazing bar with studs and brass cap nuts. (If puttyless glazing is desired, specify P-2 puttyless construction.)

#### Standard Sizes

Any length, to even feet if possible and

6 ft. wide each sash raises 18"	10 ft. wide each sash raises 30"
8 ft. wide each sash raises 24"	12 ft. wide each sash raises 36"

The following table indicates weights of material used for various sheet metal parts:

Material	Gauge of Bar	Gauge of Ridge and Gable Ends	Gauge of Curb Flashing
Galvanized Iron	18 gauge	18 gauge	24 gauge
Aluminum	14 gauge	18 gauge	20 gauge
Copper	32 ounce	20 ounce	16 ounce

#### Limits of Operating Sections

Width	Limits
6 ft.	40 feet with one operator for each side
8 ft.	40 feet with one operator for each side
10 ft.	30 feet with one operator for each side
12 ft.	30 feet with one operator for each side

## AMERICAN P-5

## Structural Puttyless Skylights

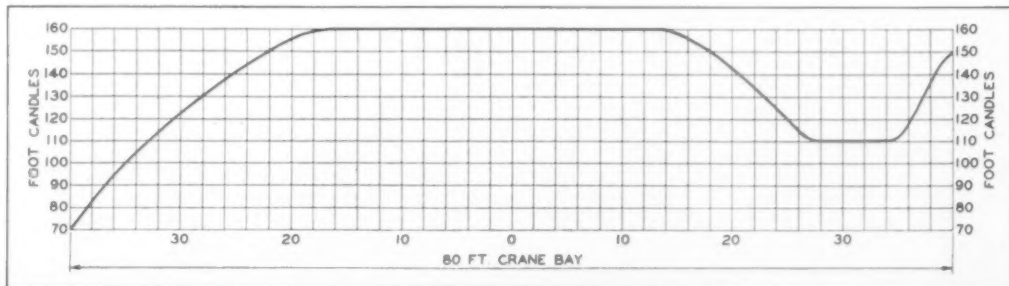
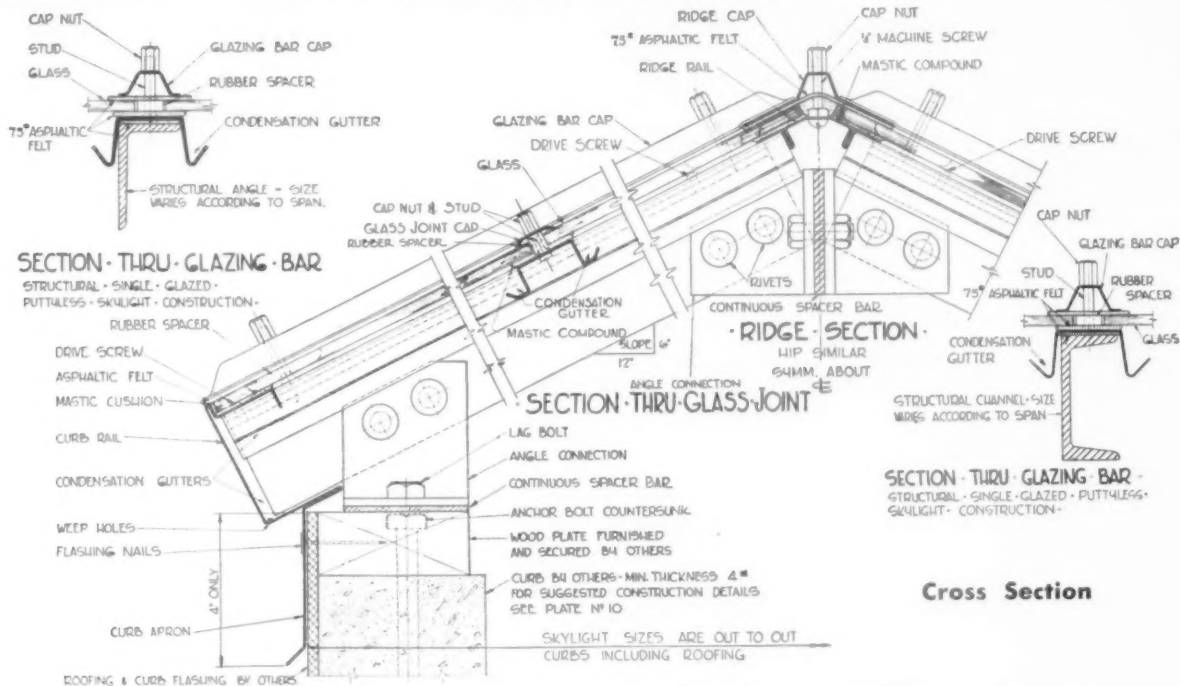
**A winning combination!** Strong steel supporting rafters, plus enduring metal trim make P-5 Structural Puttyless Skylights the engineers' choice after deciding upon stationary metal skylights for daylighting a modern industrial plant. This construction is also giving excellent service on schools, art museums, gymnasiums, field houses and other types of public buildings. Various accessories such as syphon or fan ventilators or continuous ridge ventilators may be easily incorporated. Metal trim is available formed of galvanized iron, of aluminum or of copper. Sash is arranged for puttyless glazing (single or double).

The structural rafter bars which support the glass are spaced at 2'0" centers; they are rolled steel sections, channels or angles, of

sufficient strength to carry a combined live and dead load of 40 pounds per square foot without exceeding a deflection in any member of 1/30th inch per lineal foot of span.

As no built up trusses or cross ties are required, American P-5 Skylights are particularly adaptable to modern streamlined rigid frame structures (see illustration of typical installation below). The 80'0" wide crane bay shown runs north and south. The P-5 Skylights were glazed with 1/4" frosted hammered wired glass. Excellent distribution of daylight is indicated from light readings taken January 9th at 2:00 p.m. as shown on chart below.

Consult our Sales Engineering Department for better results in plant daylighting.



Above (left) General view of roof showing stationary special P-5 12' x 200' skylight in foreground over 60' wide bays. In background over 80' wide crane bay. (right) View under 80' wide crane bay showing stationary special P-5 skylight.



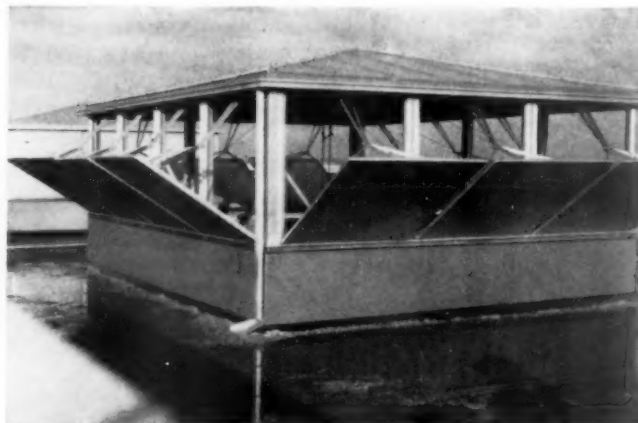
# AMERICAN Automatic Stage Ventilators

## AMERICAN Stage Ventilator No. 67-M

Automatic in case of fire. Flames shoot upwards, which prevents spreading of fire and danger of panics. A combined ventilator and weatherproof skylight for use in theatres, moving-picture houses, public, parochial and high schools, auditoriums, temples, etc.

Shutters for opening skylight are hand-operated, but may be slammed wide open instantly by cutting the rope. In case of fire, the fusible links are melted or ropes burn and shutters open automatically.

Scientifically constructed with provisions for daylighting and ventilation besides its safety features. Weatherproof—impervious to rain, snow, ice or sleet.



### SPECIFICATIONS

American No. 67-M Stage Vents are manufactured by American 3 Way-Luxfer Prism Co. Ventilator opens automatically in case of fire and is adjustable by hand for ordinary purposes.

Sheet metal trim is #24 gauge galvanized steel. (Or 16 oz. cold rolled copper).

The sides of the ventilator have well constructed corners and mullions with openings fitted with metal ventilating doors. The doors are hinged at the bottom with galvanized hinges and swing out, leaving an absolutely unobstructed passage for gases, smoke and foul air.

Connecting the upper part of each door with head jamb, is a combined jack knife bracket and check arm which acts as a lever in thrusting doors outward and at the same time prevents the doors from opening outward beyond a certain point, also holds doors rigid against wind when open.

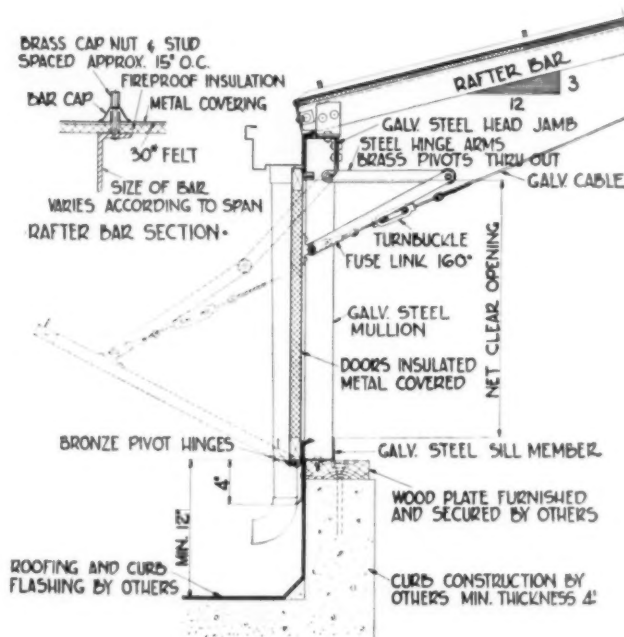
Doors are held in the closed position by flexible cables running over pulleys and attached to fusible links at the doors, the other ends of the cables being connected to one or more main control ropes. The main control ropes are carried down to a point where they can be quickly and conveniently released from the floor, using the "3 Way" control panel with lever arm release.

Doors are insulated with  $\frac{3}{8}$ " thick Celotex and are metal covered.

The roof of the ventilator is hip design of steel rafter bar construction. Roof is covered with a metal deck layed over  $\frac{3}{4}$ " thick fireproof board insulation.

All ferrous metal parts are given one shop coat of mineral primer.

Note curb construction.



## AMERICAN 3 WAY-LUXFER PRISM CO.

431 S. Dearborn St., Chicago 5, Ill.

26-20 Jackson Ave., Long Island City 1, N. Y.

# HIRSCHMAN-POHLE CO., INC.

Successor to W. F. HIRSCHMAN CO., INC.

Established 1908

140 Lent Avenue

Le Roy, New York

## Schoolhouse VENTILATION Specialties

A complete line of "Through-the-Roof" ventilation equipment widely used on modern school and college buildings. Shown below is one of our more popular electric ventilators suitable for slow fan speed with consequent absence of objectionable windage or fan sound. Other types of roof ventilators include rotary and stationary gravity ventilators, and several types of electric ventilators using propeller type fans. Your inquiries are invited and we are pleased to offer suggestions as to the type best suited to your condition.

### HIRSCHMAN "STATICK" Power Ventilator

### For High Static Pressure

#### A Pressure Exhauster—Using Non-Overloading Design of Ventilating Fan

The STATICK Power ventilator has been especially designed as a pressure exhauster for roof mounting, and its use conserves much valuable space within the building in addition to reducing installation costs without sacrifice of efficiency. It uses the conventional type of backward curved blade fan wheel that will not overload motor at any static pressure, and it provides a factor of safety for possible later changes in duct system.

This construction permits room for dampers as an integral part of the ventilator with means of access to the dampers and their operators. It also permits of fitting to other than a standard square curb where building construction makes such odd shapes desirable or necessary.

The entire fan and motor assembly is mounted on rugged welded steel angle frame by means of spring and rubber vibration absorbers. Motors used are of standard manufacture designed for vertical operation, ball-bearing, continuous duty. Our standard design is such that the motor compartment is permitted to receive free ventilation for motor cooling purposes, but this compartment

can be isolated entirely from the exhausted air where injurious fumes are being exhausted. The exhaust cowl itself has been designed to permit unrestricted air outlet and to present a pleasing appearance. Either the top cone or the entire cowl are removable for servicing.

These units can be furnished of galvanized steel, aluminum, copper or other available metals, with or without dampers, as desired. Dampers included can be of the self-acting type or for chain, electric or pneumatic control.

Capacities shown are not intended to cover entire range but are those that may be considered as standard in the most commonly used sizes. All "K" series are for silent operation.

Standard sizes of bases either for the Hirschman Double shell steel curb, or for the Built-up curb, make for economy, but bases can be furnished of any size required to fit your roof opening.

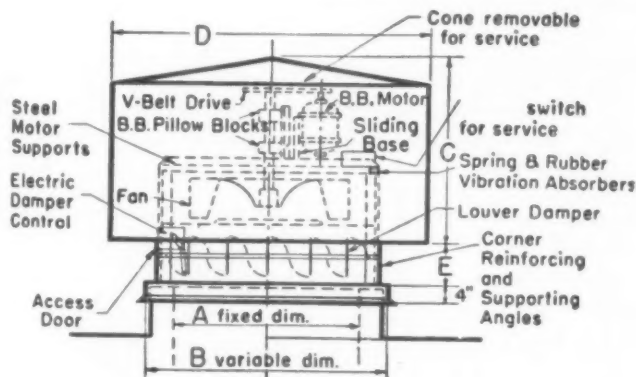
If desired, entire unit in smaller sizes can be built so as to open up on hinges at curb, for access to dampers or ducts below.

Specifications—The power ventilators shown as exhausting from (—) (—) shall have a capacity of (—) cfm at (—) static pressure powered by (—) HP motor belt driving fan at (—) rpm with tip speed of not over (—) rpm. Units shall be the STATICK Power Ventilator, as manufactured by the Hirschman-Pohle Co., Inc., of LeRoy, N. Y., or approved equal, with base mounting for curb as shown. Fully weather-proof housing shall be of (galvanized steel) (Aluminum) (Copper) (Other). Fan wheels shall be of the backward curved blade non-overloading type, with entire fan and motor assembly suspended on combination rubber and spring vibration absorbers for quiet and vibration-free operation.

CAPACITY TABLE, "STATICK" POWER VENTILATORS

Size	H.p.	Fan, f.p.m.	Tip speed, f.p.m.	Capacity, c.f.m.				
				1/2"	3/4"	1"	1 1/2"	2"
0	1/6	600	2200	800	575	465	300	—
1 K	1/6	850	3000	1150	1060	900	800	700
L	1/6	900	3200	1300	1140	1000	890	780
M	1/6	1140	4020	1620	1490	1350	1250	1140
2 K	1/6	764	3000	1360	1280	1100	980	840
L	1/4	940	3700	1810	1690	1500	1380	1200
M	1/3	1150	4500	2200	2090	1900	1760	1600
3 K	1/6	636	3000	1960	1700	1580	1430	1290
L	1/4	780	3670	2650	2560	2350	2080	1800
M	3/4	1150	5400	3980	3850	3660	3420	3290
4 K	1/4	545	3000	2740	2480	2200	2060	1870
L	1/2	680	3700	3560	3370	2990	2750	2550
M	3/4	890	4900	4820	4650	4420	4260	4000
5 K	1/4	480	3000	3600	3300	2920	2500	2060
L	1/2	630	3950	4900	4620	4310	3930	3600
M	1	780	4900	6300	5950	5680	5400	5200
6 K	1/3	424	3000	4480	3960	3550	3200	2900
L	3/4	590	4170	6700	6320	5900	5400	4950
M	2	790	5580	9200	8800	8400	8160	7900
7 K	1/2	382	3000	5460	4900	4400	4100	3700
L	3/4	500	3900	7700	7200	6780	6250	5600
M	2	650	5100	10300	9800	9400	9100	8700
8 K	1/2	346	3000	6540	5900	5300	4800	4300
L	1	450	3900	9200	8700	7900	7500	7100
M	2	590	5100	12300	11900	11400	10900	10400
9 K	3/4	320	3000	7900	7200	6500	5900	5400
L	1 1/2	460	4350	12600	11800	11100	10400	9600
M	3	540	5100	14800	14100	13500	12900	12500
10 K	3/4	290	3000	9800	8900	8100	7400	6700
L	1 1/2	380	3950	13600	12700	11800	11000	9800
M	3	490	5100	18100	17300	16400	15900	15200
11 K	1	260	3000	11500	10500	9500	8500	7500
L	2	360	4150	17700	16600	15500	14400	13100
M	5	486	5600	24200	23600	22000	20900	20000
12 K	1	235	3000	14670	13300	12000	11000	10100
L	5	400	5100	27000	26100	24900	24100	22900
13 K	1 1/2	215	3000	17900	16500	15000	13600	12300
L	5	340	4780	30100	29700	28200	27000	25900
14 K	2	192	3000	22100	19900	18000	16200	14800
L	5	300	4674	36500	34700	32600	29800	29000
15 K	2	175	3000	26800	24200	22100	20000	18000
L	7 1/2	280	4820	46500	44000	42200	40000	37600

All "K" series units are at approximately the lowest speeds for efficient operation of each size fan to assure silent operation as required for schools, hospitals, etc.



DIMENSION TABLE IN INCHES

Size	A	B	C	D	E	Weight
0	15	24	18	30	8	130
1	15	24	18	30	8	160
2	17	26	18	30	8	190
3	20	29	20	36	8	265
4	23	32	24	39	8	360
5	26	35	24	42	10	430
6	29	38	24	44	10	550
7	32	41	26	47	10	650
8	36	45	30	53	10	740
9	39	48	30	58	10	900
10	42	51	32	64	10	1100
11	46	55	34	72	12	1260
12	51	60	36	82	12	1400
13	55	64	36	88	12	1600
14	61	70	38	95	12	1840
15	67	76	42	110	12	2100

(1) The "B" dimension shown is considered as standard, but can be varied to suit your building conditions.

(2) Self-acting dampers may be mounted in neck above the top of the curb as an integral part of the ventilator unit. Dampers may also be furnished for chain, electric or compressed air control.

(3) Access to motor and fan assembly by removable top cone; larger sizes include access door in storm-band. Also convenient access door for access to dampers and their operators.

Notes:—"C" and "D" dimensions may vary slightly if other than standard motor frame is used.

"E" dimension varies slightly with type of damper and its control.

\* T.M. Reg. U. S. Pat. Off.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# THE SWARTWOUT COMPANY

18511 Euclid Avenue

Cleveland 12, Ohio, U.S.A.

REPRESENTATIVES IN ALL PRINCIPAL CITIES

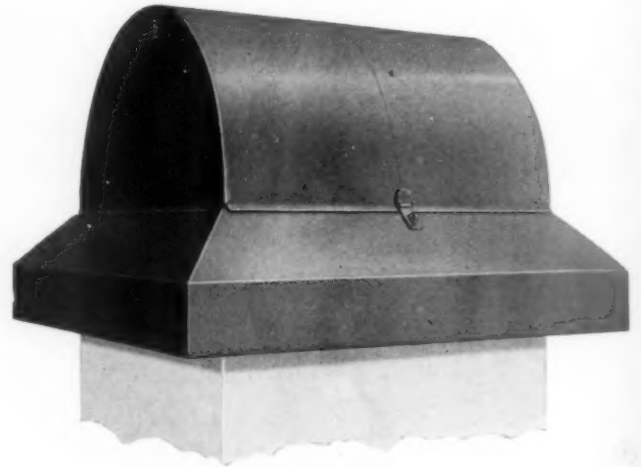
**F**OR OVER FORTY YEARS The Swartwout Company has supplied roof ventilating equipment to schools, industry, public buildings, transportation systems, etc. A wide variety of carefully engineered designs in both gravity and powered facilities is available for structures such as field houses, gymnasiums; for stage ventilation; and the equipment described on this page for efficient silent exhaust against duct resistance.

## THE SWARTWOUT AIRLIFT



Swartwout has developed the Airlift around a completely engineered fan and throat unit designed to emphasize the principle that lower operating noise levels are attained when fan tip speed is slower. To overcome the loss of efficiency usually encountered with slower tip speeds, the Swartwout backwardly curved blade fan has been carefully designed to incorporate the venturi principle in the fan wheel base. Further, the wheel overlaps the ventilator's throat, providing a close-coupled construction continuing the effect of the building duct. The entire assembly insures positive exhaust with a minimum of friction and turbulence, and unusually quiet operation.

The sturdy fan wheel is nicely balanced on its drive shaft made easy running and efficiently suspended by vertical thrust ball bearings. Welded structural steel framing supports the outer housing, the motor and fan wheel assembly. NEMA type motor has hinged mounting for adjustment of belt drive and easy belt replacement. Motors furnished have ample brake horsepower for capacities and static pressures rated.



The Airlift has a ventilated hood which is easily accessible for servicing the motor unit. It is equipped with mounting insulator to reduce vibration transmission to a minimum. Louver dampers can be furnished which open automatically when fan is started. Construction of the Airlift is galvanized steel as standard, with copper, aluminum or stainless steel available on order.

The Airlift is provided with a steel curb which fits over structural curb of concrete or wood. Conduit is furnished from safety disconnect switch extending through base of ventilator.

Capacities indicated in table are but indicative of the range. A more complete tabulation, showing 49 variations over the 14 sizes, is found in Bulletin 341 which describes the Airlift more fully.

Write for catalog material on the complete line of Swartwout Roof Ventilators and Louvers.

## SWARTWOUT AIRLIFT CAPACITIES

Indicative for Each Size. Write for Complete Range of Capacities Available

Fan, Size	Motor, H.P.	Fan, R.P.M.	Minimum, C.F.M. — Static Pressure					
			1/8" S.P.	1/4" S.P.	3/8" S.P.	1/2" S.P.	5/8" S.P.	3/4" S.P.
13"	1/6	1040	1240	1120	1005	875	730	.....
15"	1/3	1115	1935	1810	1695	1575	1440	1300
18"	1/2	980	2930	2740	2560	2370	2180	1980
21"	3/4	890	4380	4210	4030	3800	3560	3280
24"	1	768	5510	5240	4970	4720	4370	4050
27"	1 1/2	693	7250	6980	6700	6350	6000	5530
30"	1 1/2	595	8380	8000	7600	7120	6610	6000
33"	1 1/2	507	9030	8550	8000	7400	6810	6200
36"	2	488	11900	11330	10710	10020	9230	8310
40"	3	456	15300	14700	14000	13220	12360	11320
44"	3	399	17500	16400	15300	14200	13100	12000
48"	5	395	24500	23500	22450	21300	20000	18600
54"	5	341	28700	27650	26450	25000	23500	21800
60"	5	279	29900	27800	25900	23700	21700	19300

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

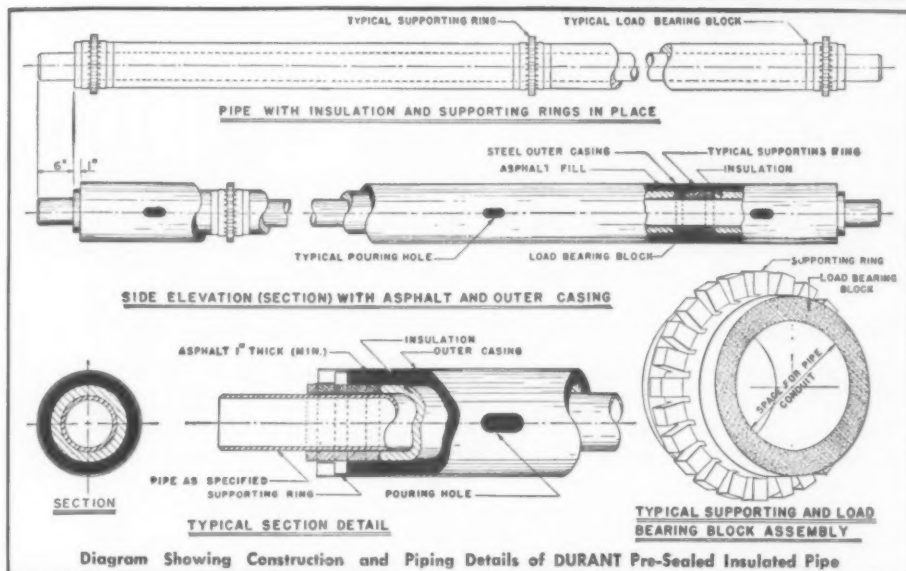


# DURANT INSULATED PIPE COMPANY

Manufacturers of the ORIGINAL Pre-Sealed Pipe

1015 Runnymede St., P. O. Box 88

Palo Alto, California



Trademark Reg.  
U. S. Pat. Off.

- ★ Molded insulation of best quality
- ★ Completely waterproof
- ★ Long term dependability
- ★ Requires no sub-drains
- ★ Electrolysis and corrosion eliminated
- ★ Lower field costs
- ★ Minimum field work and trenching
- ★ Needs no tile or masonry protection
- ★ Low initial cost and low maintenance

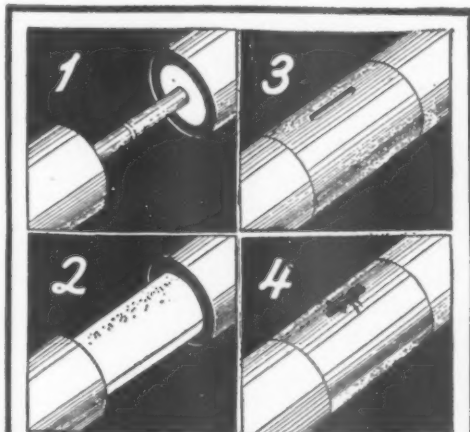
## The Original Positive Protection for Underground Conveyance of STEAM, HOT WATER and REFRIGERANTS

**Construction**—The DURANT Construction Principle is simple and effective, and thousands of installations have proved its reliability over long term periods.

D. I. P. is constructed by encasing pipe in the most efficient and dependable types of molded insulation. This is then encased in a heavy layer of high-melting-point, non-porous asphalt, which is applied by pouring, when hot, into a heavy-gauge metal casing around pipe and insulation. Design and construction insures a 1" minimum asphalt thickness and proper load-bearing supports within the completed conduit. The combination of asphalt and sheet metal casing presents a completely waterproof barrier which will resist moisture, acids, and alkalis, as well as mechanical shocks, ground pressure, and similar hazards.

For installation purposes, sufficient bare pipe is left exposed at each end of D. I. P. pipe lengths to permit connections in the field.

**Installation**—Field operations for installing D. I. P. are limited to placing pipe lengths in position, connecting them, and after pressure tests, insulating and sealing the joints. Field joint work is relatively simple. Materials are always supplied by the factory, along with complete instructions. The DURANT System is effectively applied to pipe in ells, tees, expansion loops and bends, short lengths, and special fittings. We catalog a wide variety of standard factory-built fittings, ready for installation on the job.



### 4 Simple Steps

1. Field joint ready for inspection. 2. Joint covered with standard pipe insulation. 3. Durant joint casing in place ready for asphalt. 4. Asphalt poured in slot making a perfect seal.

DURANT Processes and Products are protected by registered U. S. Patents and Patents Pending

## "NON-SWEAT" INSULATION for Ice Water, Brine or Special Refrigerants

**Construction**—D. I. P. "Non-Sweat" Insulation has proved its ability to meet the varied needs of the refrigeration and allied industries. The sweat-proof characteristic is obtained by use of the well-known DURANT Moistureproof Covering, together with a special asphalt used only for cold lines. Construction is the same as for other D. I. P. products.

**Installation**—Procedure for installation of D. I. P. Non-Sweat Insulation is the same as for regular DURANT Pre-Sealed Systems and has proved to be exceptionally economical for providing dependable, long-life insulation efficiency.



Complete detailed information and engineering data on request. Representatives in principal cities

# THE RIC-WIL COMPANY

## INSULATED PIPE CONDUIT SYSTEMS

Union Commerce Bldg., Cleveland, Ohio

FACTORY: Barberton, Ohio

OFFICES IN PRINCIPAL CITIES

### *Ric-wil offers Conduit for every need—*

**THE MOST COMPLETE LINE—MEETING ALL CONDITIONS OF SERVICE AND COST**  
THERE IS A RIC-WIL INSULATED CONDUIT SYSTEM ENGINEERED TO THE SPECIFIC NEEDS OF SCHOOLS, UNIVERSITIES AND OTHER INSTITUTIONS FOR THE DISTRIBUTION OF STEAM AND HOT WATER — PROVIDING THE MOST EFFICIENT INSULATION AND PROTECTION



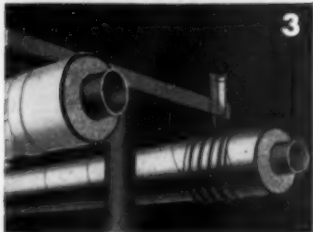
#### 1. Ric-wil INSULATED PIPE UNIT—SINGLE OR MULTIPLE PIPES

Prefabricated complete units with one or more pipes—in any specified combination—in helical corrugated conduit, coated and wrapped with asphalt saturated asbestos felt. 21-ft. lengths for easy installation. Insulation is applied to any or all pipes in any thickness specified.



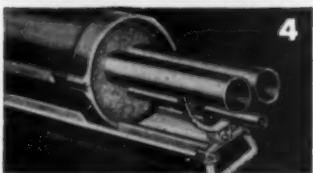
#### 2. Ric-wil INSULATED PIPE UNIT—FOR PROCESS LIQUIDS

An adaptation of the multiple system used where a steam or hot water line heats fluids in other lines. Pipes are insulated from the exterior but not from each other. Sizes and specifications as required—conduit same as for other insulated pipe units.



#### 3. Ric-wil FOILCLAD PIPE UNITS—FOR OVERHEAD LINES

Pipe and insulation are protected and waterproofed by a double coating of machine-applied, high temperature asphalt. Unit is then wrapped with asbestos felt and covered with a final spiral wrapping of copper or aluminum foil for maximum insulation and protection.



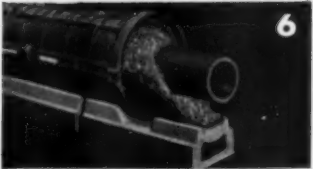
#### 4. Ric-wil STANDARD TILE CONDUIT

Vitrified glazed A.S.T.M. Standard Tile housing—acid- and weatherproof—with foundation type base drain supporting weight of piping through correctly engineered pipe support. For single or multiple pipe system—filler type insulation or sectional pipe covering.



#### 5. Ric-wil SUPER-TILE CONDUIT

Same advantages as Standard Tile but with walls approximately double-thick for strength under heavy traffic or where overhead load is above normal. Will support static load of 6 tons per wheel under actual installation conditions. Base drain of extra-heavy tile.



#### 6. Ric-wil CAST IRON CONDUIT

Heavy reinforced cast iron conduit for use where underground pipe lines run close to or under railroad tracks. Durable, water tight, vibration-proof, clamps for extra tightness.



#### 7. Ric-wil TILE CONDUIT — UNIVERSAL TYPE

Where installation conditions dictate the use of a concrete pad, Ric-wil Universal Tile is recommended. Side walls are double-cell vitrified trapezoidal block design. Arch may be Standard Tile, Super Tile, or Cast Iron.

**Ric-wil CONDUIT ACCESSORIES.** Ric-wil accessories are available in all type systems; standard and special fittings, factory fabricated or field fabricated expansion devices, alignment guides, anchors, etc. Descriptive bulletins on request. Write: The Ric-wil Co., Dept. 319.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# SARGENT BUILDING SPECIALTIES, INC.

610-12 Devon St.

Arlington, N. J.

SALES OFFICES IN PRINCIPAL CITIES

# EQUAL AIRE

## SCHOOL RUBBISH INCINERATORS and HEAVY DUTY DESTRUCTORS

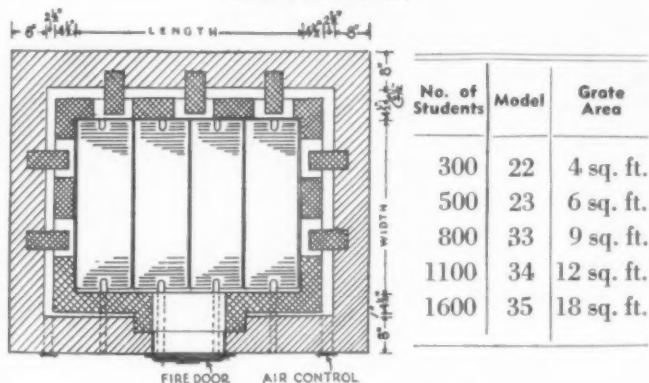
### EQUAL-AIRE INCINERATORS:

For schools where the disposal problems consist mainly of combustible waste, an Equal-Aire Incinerator can usually be adapted to the base of the boiler flue below the boiler breeching. These units can be fed through a 20" x 18" or 20" x 26" firing door, and are equipped with full dumping grates. This type of construction is most economical and satisfactory.

### SPECIFICATION:

Furnish and install where shown on plans SARGENT INCINERATOR(S), MODEL . . . . ., equipped with full dumping grates, . . x . . firing door, 16 x 13 ash door, spark arrestor, butterfly damper, air controls and cast iron grate frame. All work to be completed in a neat and workmanlike manner in strict accordance with detailed drawings and specifications of the manufacturers, SARGENT BUILDING SPECIALTIES, INC., ARLINGTON, N. J.

### CAPACITIES:



### OTHER APPLICATIONS:

Where special conditions and limitations arise recommendations will be gladly suggested without obligation. Sargent Incinerators offer to school designers and officials thirty years of research, engineering and actual installation experience. A full incinerator line of small portable units, school rubbish burners, flue fed incinerators, industrial utility units, and heavy duty destructors are available for your every waste disposal problem. All parts are manufactured of the finest grade high silicon gray iron which produces the cleanest, toughest castings.

### SARGENT HEAVY DUTY DESTRUCTORS:

In planning new institutions many architects and engineers are planning for cafeteria and lunch room space. A Sargent Heavy Duty Model E Destructor will adequately destroy garbage and trash before it accumulates; eliminating odors, flies, and unsanitary elements. The Model E destructor comes in various sizes with capacities ranging from 110 lbs. to 1000 lbs. per hour. Larger units are available if desired. These Models will consume waste with a maximum of 50% wet garbage content, without auxiliary fuel. In the event that wet waste exceeds this



TYPICAL 2-E-215# PER HR.—SCHOOL INSTALLATION

percentage, gas, oil, wood or coal can be used as fuel. Anatomical wastes from laboratories, and infirmaries can be completely destroyed in a Sargent gas fired pathological destructor. Destructors are generally located in the basements adjacent to a boiler breeching or stack for economical installation. If an independent stack or flue is available it is desirable but not necessary. Locating a unit below grade has the advantage of being able to charge the waste from the floor above through a *charging* hole in the destructor roof. If desired they may be erected free-standing in an outside area or small building. All Sargent Incinerators are guaranteed as to design, workmanship, materials, and performance. They are erected by our own experienced crew. Write for specifications and preliminary layouts.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



# WASHBURN & GRANGER, INC.

(Founded in 1906)

53 Park Place, New York 7, N. Y.

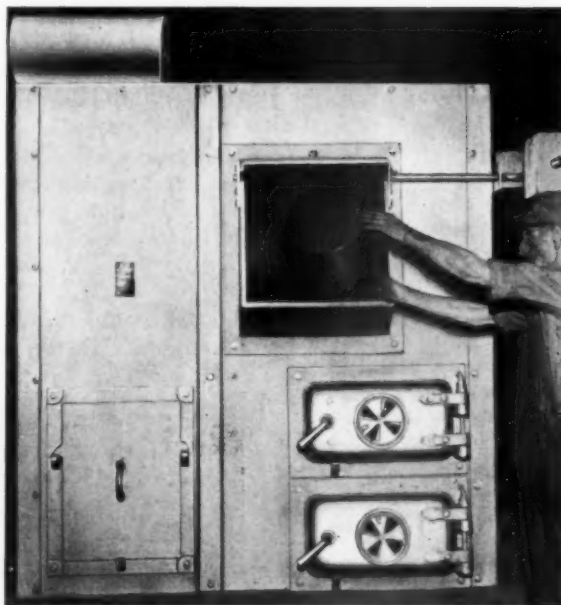
"Efficiency Plus" With "Dean" Incinerators

## "DEAN" Incinerators

### FOR ALL SERVICES IN INCINERATING WASTES

#### "DEAN" TYPE "L" COMBUSTIBLE RUBBISH INCINERATOR — DRY WASTE

Strictly a utility furnace with an economical initial cost, having a combustion chamber, and large access doors. For burning loose paper and other refuse of a readily combustible nature. Adapted for use in schools, libraries, townhalls, and other public buildings.



(Photo above illustrates all units except L-1/2 and L-N 1/2)

#### "DEAN" TYPE "L-N" REFUSE INCINERATOR UP TO 50% WET WASTE BY WEIGHT

Similar to the Type "L" Incinerator with the addition of a refractory hearth. If necessary, auxiliary fuel (coal or gas) may be used to make up for the dry waste deficiency. For use in schools and colleges with cafeterias, and small hospitals, convents, factories, etc.

#### COMPLETE COMBUSTION WITHIN THE UNIT ITSELF

MODEL NO.	CAPACITY Lbs. per Hr.	DIMENSIONS		
		LENGTH	WIDTH	HEIGHT
L-1/2	60	5'-4"	2'-9 1/2"	4'-9"
L-1	120	6'-10 1/2"	3'-3"	6'-0"
L-2	200	6'-10 1/2"	3'-9"	6'-0"
L-3	300	6'-10 1/2"	4'-3"	6'-0"
L-5	500	9'-7 1/2"	4'-3"	6'-4"

MODEL NO.	CAPACITY Lbs. per Hr.	DIMENSIONS		
		LENGTH	WIDTH	HEIGHT
L-N 1/2	50	4'-0"	2'-9 1/2"	4'-4"
L-N1	100	5'-10 1/2"	3'-4"	6'-0"
L-N2	200	7'-2"	3'-9"	6'-0"
L-N3	300	7'-6"	4'-3"	6'-0"
L-N5	500	9'-1 1/2"	4'-9"	6'-0"

#### Specification

Furnish and install one "Dean" Type L—, or L-N— steel encased incinerator lined with No. 1 Penn. fire brick and insulating brick, with heavy charging door and frame, and large size stoking, ash and refractory lined combustion chamber cleanout doors. Furnish heavy grate and support, and steel encased damper. Casing not less than

No. 11 gauge plate reinforced with angles and channel buckstays. Furnish flue to chimney approximately — ft. long, also firing tools consisting of hoe and rake with tool hanger. Paint one coat prior to shipment and one coat aluminum paint after erection. Gas burner optional on Type L-N only.

**Other Models and Larger Capacity Available—Send for Folder 61A**

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# GRINNELL COMPANY, INC.

Executive Office: Providence, R. I.

BRANCH OFFICES: ALBANY — ATLANTA — BALTIMORE — BOSTON — BUFFALO — CHARLOTTE — CHICAGO — CINCINNATI — CLEVELAND — COLUMBUS — DALLAS — DENVER — DETROIT — FRESNO, CAL. — HOUSTON — KANSAS CITY, MO. — LONG BEACH, CAL. — LOS ANGELES — MEMPHIS — MILWAUKEE — MINNEAPOLIS — MONTREAL — NEW ORLEANS — NEW YORK — NEWARK — OAKLAND, CAL. — PHILADELPHIA — PITTSBURGH — PORTLAND, ORE. — RICHMOND — ROCHESTER, N. Y. — SACRAMENTO — SAN FRANCISCO — SEATTLE — SPOKANE — ST. LOUIS — TORONTO — VANCOUVER — WINNIPEG.

## CAN YOU SAY YES...WITHOUT RESERVATION...TO THIS QUESTION?

*Are they completely protected, continuously protected,  
dependably protected against*

# fire?

There are five school fires every day, some in buildings considered "fireproof". But no "fireproof" construction can prevent the combustible contents of a building from burning. Waste will accumulate. Supplies must be stored. Heating and lighting equipment does fail. Human negligence can't be entirely eliminated.

Only automatic sprinkler fire protection safeguards the lives of school children *anywhere* in the building, at *all times*, and *automatically*—without dependance on uncertain human vigilance. A Grinnell Automatic Sprinkler System stands ready unflinching to stop fire at its start, often before it is discovered.

Your responsibility for the *dependable* protection of young lives and valuable property can be met fully with a Grinnell Automatic Sprinkler System. For your own sake be sure the schools for which you are responsible are protected with the famous Grinnell Automatic Sprinkler heads—your assurance of protection against fire.

A Grinnell Engineer will help you survey the danger spots in your schools and show you how they can be protected. Write or call the Grinnell office near you . . . there's no obligation.



# GRINNELL

FIRE PROTECTION SYSTEMS

# THE HALSEY W. TAYLOR CO.

Manufacturers of Drinking Fountains and Coolers

Warren, Ohio

AGENTS IN PRINCIPAL CITIES

## PRODUCTS

Drinking fountains, pedestal, recessed and wall types. Water coolers, electric, and ice and bottle types.

### DISTINCTIVE FEATURES THAT APPEAL TO ARCHITECT AND SCHOOL AUTHORITIES

Over the years Halsey Taylor Drinking Fountains have attained an enviable reputation for positive sanitation and conveniences in thousands of installations the world over. During the first world war and again in the second, these fountains won the approval of the Government and Military authorities as the ideal sanitary fountains, continually improved and refined. Halsey Taylor Drinking Fountains are today the most modern and dependable in use, for schools, hospitals, hotels, municipal and public buildings, churches and commercial and industrial operation.



*It will pay you to investigate Halsey Taylor modern, sanitary drinking fountains which give you definite assurance of dependable, trouble-free service, proper health safety, maximum conveniences, built-in patented features exclusive with Halsey Taylor. Be sure, be safe, buy Halsey Taylor for health safety!*

School authorities can be sure of health safety and long, dependable trouble-free service when they specify the correct Halsey Taylor fountain for their buildings.

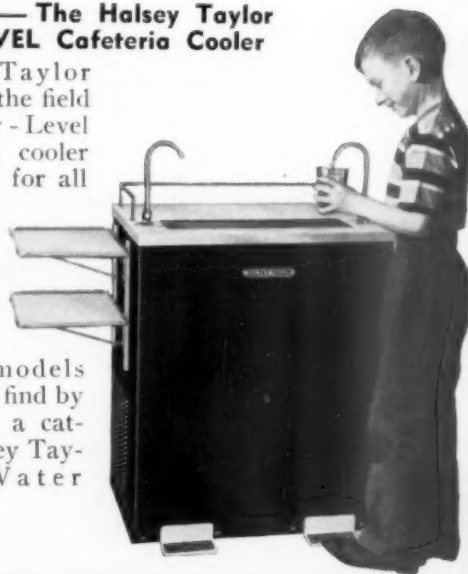
- 1—**Practical Automatic Stream Control**—Automatic device maintains constant height in drinking stream regardless of line pressure variation. Stream never too high, never too low.
- 2—**Ideal Drinking Mound**—The two-stream projector with latest type guard makes the side stream both practical and health-safe, removing objections found with ordinary side-streams.
- 3—**Definite Sanitation**—Drinking mound formed by converging of two streams of water, setting up a localized drinking mound which makes it impractical to drink from any other point. Fingers or lips cannot come in contact with or contaminate water source.

**Fountains for every requirement:** This page shows you but a few of the various types of the Halsey Taylor drinking fountains. There is a model for your every need, all of them modern in styling and all incorporate the exclusive Taylor features. Write today for a complete catalog.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

### It's New — The Halsey Taylor LOW-LEVEL Cafeteria Cooler

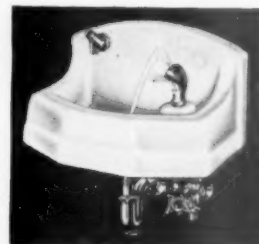
Halsey Taylor again leads the field with a Low-Level cooler, the cooler that is ideal for all places where small children congregate. This is but one of the many distinctive models that you will find by writing for a catalog of Halsey Taylor Electric Water Coolers.



Many attractive Pedestal and Wall types



No. 4615



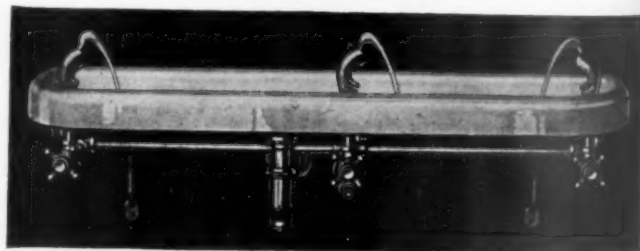
No. 4914



No. 4901

#### Battery Types

Many two- and three-part battery types especially adapted to school installations



No. 2703

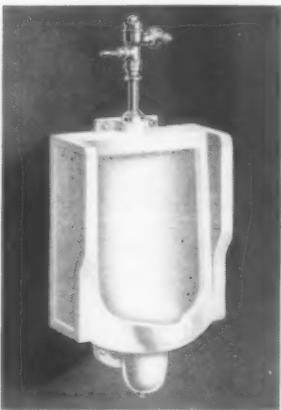


# CRANE CO.

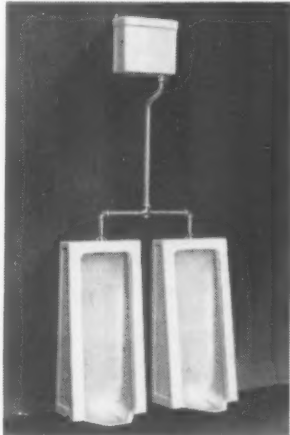
**CRANE Plumbing and Heating, Valves, Fittings, Pipe**  
 General Office: 836 South Michigan Avenue, Chicago 5, Illinois  
 NATION-WIDE SERVICE THROUGH BRANCHES, WHOLESALERS, PLUMBING AND HEATING DEALERS

## QUALITY PLUMBING AND HEATING FOR EVERY SCHOOL AND UNIVERSITY NEED

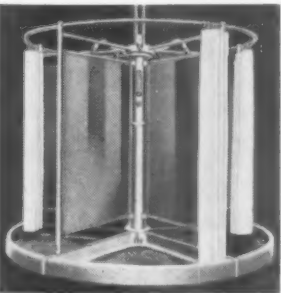
The complete line of Crane plumbing equipment for schools and universities includes fixtures for every service—every installation. All are designed to insure proper sanitation, dependable service, long life and low maintenance cost. Crane quality plumbing fixtures are made of highest quality vitreous china and vitreous glazed *Duraclay* for lasting beauty and ease of cleaning. All mechanical parts are ruggedly constructed to withstand severe usage. You can also depend on Crane for the best in valves, fittings and all necessary piping for your particular requirement. Shown here are a few of the many items in the complete Crane line. For further information, consult your plumbing contractor or call your nearest Crane Branch.



**7-80 Neu-Rio** vitreous china urinal with extended shields and integral flushing rim and trap. Chromium-plated Crane *Triumph* flush valve. Urinal has receding concave back to minimize splashing. Can be installed in batteries with one vitreous china tank set to flush simultaneously at intervals of from one to sixty minutes. Overall width 18".



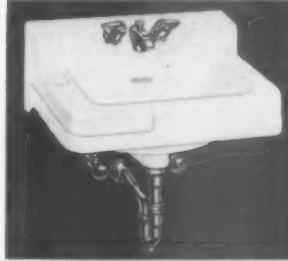
**7-47 Sanitor** slope front urinal made of *Duraclay*, earthenware vitreous glazed. Available singly or in batteries. Supplied with vitreous china tanks with *Alert* automatic siphon valves and *Marvel* float valves. Overall width, each urinal 18". *Sanitor* urinals are also available in vitreous china with integral flushing rim.



**Bradley Multi-Stall Showers** are available in three and five stall circular and semi-circular models, with or without receptors. Require but one set of supply pipes and one drain. Equipped with curtains, shower heads, goose-necks, control valves and soap trays.



**6-515 Clearstream** vitreous china drinking fountain with integral strainer. *Purflo* angle stream bubbler. *Victor Magiclose* self-closing valve. Bubbler base located above rim of receptor as a safeguard against back siphonage.



**1-135-E Oxford** vitreous china lavatory with beveled panel, shelf back and soap depression. *Whitney* supply with *Dial-ese* controls, direct lift waste. Sizes: 19" x 17" and 20" x 14".



**1-243 Norwich** vitreous china lavatory with 6" high back, rectangular basin, splash lip and soap depression. Has wall-mounted, self-closing mixing valve with hinged foot pedals. Raised spout. Sizes: 20" x 18" and 24" x 21".



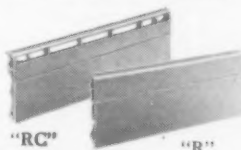
**3-525 Santon** elongated rim, siphon jet closet with concealed pressure tank and seat-operated flush valve. Open-front wood seat.



**3-460 Rapidway** blow-out wall-type closet with elongated rim, chromium-plated Crane *Triumph* flush valve and vacuum breaker. Supplied with open front hard-rubber seat.

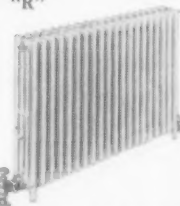
### Everything for the Heating System

The complete line of Crane heating equipment includes boilers, radiators and baseboard panels, controls, specialties, pipe, valves and fittings—everything necessary for every type of heating system for schools and universities.

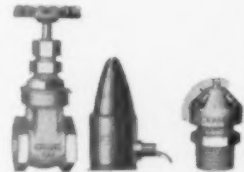


Sectional Boilers, up to 1,560,000 Btu. net capacity.

**Radiant Baseboard Panels:** Available in two types. Type *RC* for radiant and convection heating, Type *R* for radiant heat only.



**Compact Radiators.** Slim tube—3 to 6 tubes, Height 19" to 32".

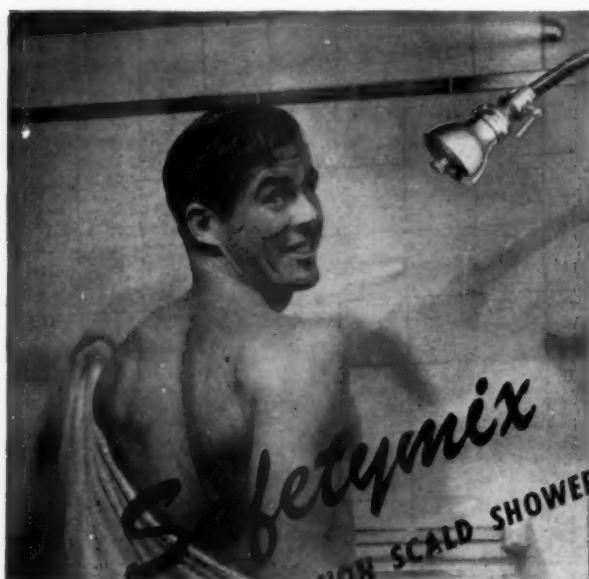


Specialties for every heating system.

A COMPLETE LINE OF OIL BURNERS AND STOKERS IS ALSO AVAILABLE FROM CRANE

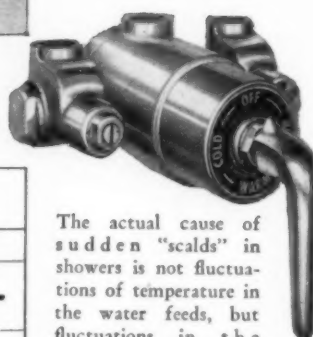
# SYMMONS ENGINEERING COMPANY

791 Tremont Street, Boston, Massachusetts

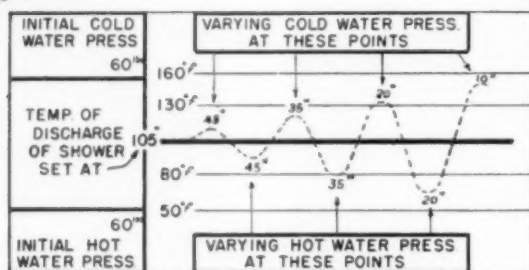


## Protect Students against Shower Scalds

Educational institutions throughout the country, upon careful examination, have added the Symmons SAFETYMIX non scald shower valve to their plant equipment. Not alone have students and physical directors approved this measure, but administrators have found it a desirable expenditure.



**PRESSURE ACTUATED NON SCALD SHOWER VALVE**



### To Superintendents of Maintenance:—

This chart shows (indicated by heavy black line) the results of the effectiveness, by the use of Symmons SAFETYMIX non scald shower valve against that (indicated by the dotted line) of a two valve shower unit or ordinary mixing valve.

SAFETYMIX is now available in complete packaged units as illustrated below.

The actual cause of sudden "scalds" in showers is not fluctuations of temperature in the water feeds, but fluctuations in the pressures.

Therefore a shower valve that nullifies these pressure fluctuations eliminates this scald condition.

Symmons SAFETYMIX does just that. It is the only non scald shower valve guaranteed to maintain the discharge temperature within 2° F. against pressure fluctuations up to 85% in either hot or cold supply.

It costs no more than ordinary valves.

It is simple to install. It is "as easy to fix as a faucet."

## Symmons SAFETYMIX

pressure actuated non scald shower valve is in use at:—

Michigan State College  
Mass. Institute of Technology  
Dartmouth College  
University of Cincinnati  
Johns Hopkins University  
State Teacher's College  
Wellesley College  
University of Chicago  
University of Maine  
Brown University  
Connecticut College  
College of the Holy Cross  
Leland Stanford University  
Marquette University  
Austin Public Schools  
University of Washington  
DePaul University  
Western Reserve University  
University of Pittsburgh  
William and Mary College  
Loyola University  
Chateau Laurier  
Canadian National Railways  
Royal Canadian Airforce  
Canadian Vickers  
Royal Montreal Golf Club  
Dominion of Canada



THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# AMERICAN CONCRETE CORPORATION

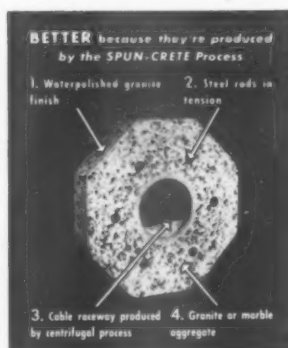
N. Lamon Avenue  
Chicago, Ill.

## HY-LITE STANDARDS for efficient grounds lighting in the best of taste!

**T**HERE are excellent reasons why these attractive lighting standards are the well-considered choice of scores of schools across the country.

Available in simple designs of good taste, with beautiful granite finish, they blend perfectly with school architecture and landscaping. They're built for a lifetime of service with very little if any maintenance, are easy and economical to install. They come in a range of sizes just right for *any* school grounds lighting need.

Adequate, efficient outdoor lighting protects students and school property, adds to the utility and appearance of the campus. With HY-LITE standards you'll be ahead on every count. For complete details, write to American Concrete Corporation, N. Lamon Ave., Chicago, Ill.





# BENJAMIN ELECTRIC MFG. CO.

General Offices: Des Plaines (Chicago Suburb), Ill.

230-234 W. 17th Street  
NEW YORK

20 N. Wacker Drive  
CHICAGO

829 Folsom Street  
SAN FRANCISCO

## FLOODLIGHTING SPORTS AREAS

HUNDREDS OF SCHOOLS throughout the country have found the answers to their problems of stimulating attendance and increasing revenue from football in Benjamin floodlighting for night games.

Night football, just like softball and other floodlighted night sports, is assured of a greater following because it takes advantage of most peoples' leisure time and offers them entertainment at a time when they are free and seeking it.

5076



Illumination for the football field of Loyola University in New Orleans, Louisiana, is provided by Benjamin "Play-Area" floodlights using 1500 watt lamps



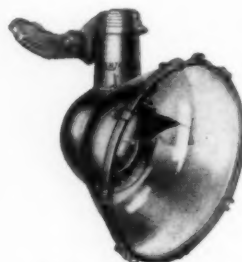
An installation of Benjamin Long Range "Alzo-Lite" floodlights using 1500 watt lamps at Bowman Gray Memorial Stadium, Winston-Salem, North Carolina



"SENIOR PLAY-AREA"  
For 750-1500 watt lamps



"ELLIPTO-LITE PLAY-AREA"  
for 300-500, 750-1500  
watt lamps



Long Range "ALZO-LITE"  
For 750-1500 watt lamps



Wide-Spread "ALZO-LITE"  
For 750-1500 watt lamps

Benjamin "Senior Play-Area" floodlights meet every requirement of football lighting by providing exceptionally high intensity illumination forward and toward the sides of the floodlighting unit. They combine in one unit a large open-type porcelain enameled steel reflector with an inner auxiliary reflector of processed oxidized aluminum which assists in building up illumination over distant areas.

Benjamin "Ellipto-Lite Play-Area" Floodlights are similar in general construction to "Senior Play-Area" Floodlights, but are provided with a slightly smaller porcelain enameled steel reflector. In light output they compare favorably with the "Senior Play-Area" Floodlights.

Benjamin Long-Range "Alzo-Lite" Aluminum Floodlights meet the requirements for football field lighting from behind the stands or when floodlights must be located 60 to 120 feet back from the sideline. An etched Alzak aluminum deflector redirects a portion of spill light downward to provide illumination in the stands.

Wide-Spread "Alzo-Lite" Aluminum Floodlights meet the need for a unit with a light distribution between the spread characteristic of porcelain enamel diffusing floodlights, such as the "Senior Play-Area" or "Ellipto-Lite Play-Area" and the more concentrated distribution of the Long-Range "Alzo-Lite."

## LIGHTING INTERIOR AREAS

**Gymnasiums and Interior Recreation Areas**—This type of location requires a lighting unit that is well protected against jars and hard knocks. In addition, the lighting unit must provide good general illumination so that fast-flying objects such as basketballs can be readily seen by players and spectators.

For such locations, the Benjamin Glassteel Diffusers and enclosing globe units with the Benjamin two-piece wire guard are recommended. The Benjamin Gymnasium Lighting Unit which is completely enclosed by a heavy gauge metal canopy and a heavy, basket-type steel wire guard is also an excellent unit for these locations. This latter unit has a special shock-absorbing socket arrangement that prolongs lamp life by protecting lamp filaments from mechanical jars and shocks.

**Vocational and Engineering Buildings**—Benjamin "Stream-Flo 40" fluorescent units are recommended for the lighting of classrooms and buildings devoted to engineering and vocational pursuits. They are also recommended for laboratories where no corrosive fumes, moisture or hazardous atmospheric conditions are present. "Stream-Flo 40" fluorescent units are ruggedly constructed for long dependable service, with housings of heavy gauge steel and closed-end porcelain enameled steel reflectors.

**Laboratories**—For laboratories where explosive hazards are present, a complete line of incandescent Explosion Proof and Dust Tight equipment is available; where moisture and non-combustible fumes are prevalent, "Vapolet" units meet the requirements.

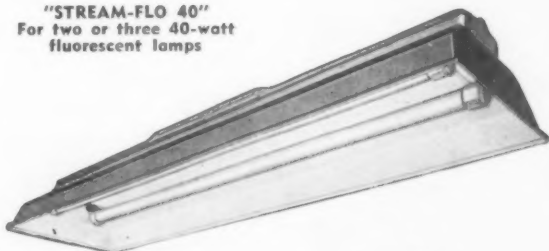
If fluorescent lighting equipment is desired, the Benjamin "Vapor-Tite 40" Unit (approved as vapor-tight by Underwriters' Laboratories) is recommended for humid, dirty locations and the Type II-G "Sealed-Flo 40" is recommended for locations with combustible dusts.

**Library Stacks and Store Rooms**—For lighting book stacks in the library or shelves and bins in the store room, the "Stock-Bin-Lite" is recommended. The "Stock-Bin-Lite" provides uniform illumination from top to bottom of shelves.

The services of Benjamin lighting specialists are available for recommendations on improvement of existing lighting, as well as for recommendations on new lighting.

**Write for information on your specific lighting problem**

"STREAM-FLO 40"  
For two or three 40-watt  
fluorescent lamps

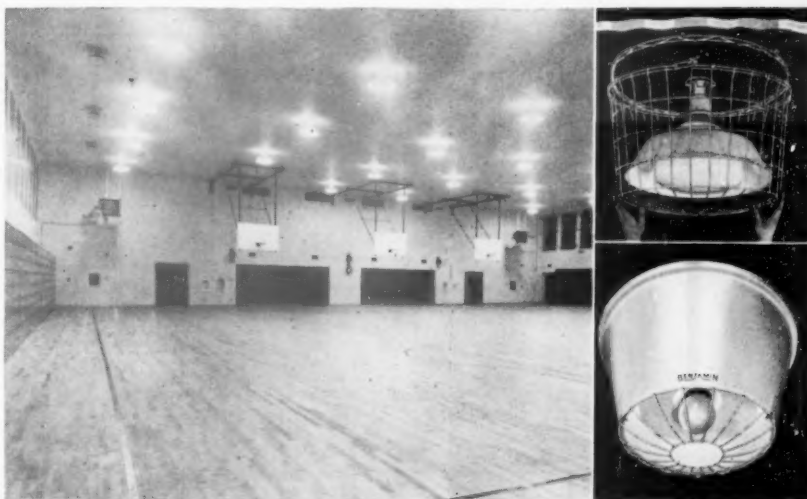


"STOCK-BIN-LITE"  
For 60-75, 100, 150 watt  
incandescent lamps



"GLASSTEEL DIFFUSER"  
For 300-500, 750-1500  
watt incandescent lamps

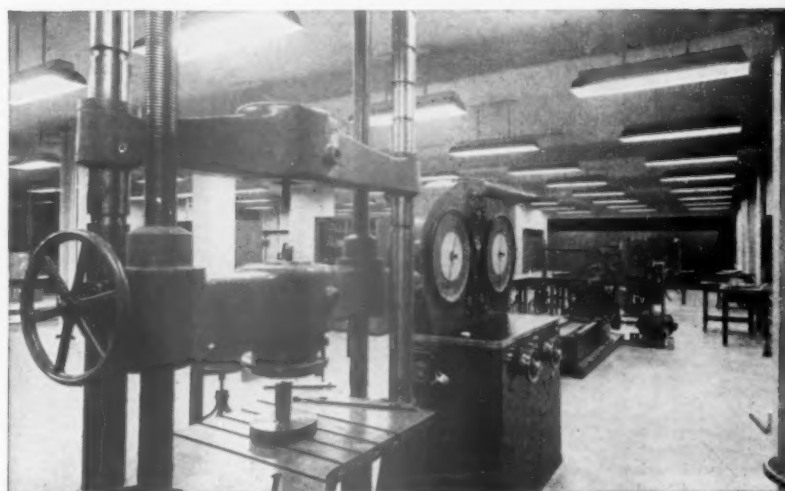
5076



Grade Classroom at Central School, Des Plaines, Illinois, lighted with Benjamin "Sky-Glo" Louver System installed below Benjamin fluorescent units using 40-watt lamps



General Chemistry Laboratory of Northwestern Technological Institute, Evanston, Illinois, effectively lighted by "Stream-Flo 40" units using two 40-watt fluorescent lamps



Illumination for Materials Testing Laboratory at Northwestern Technological Institute, Evanston, Illinois, provided by "Stream-Flo 40" units for two 40 watt fluorescent lamps

# CURTIS LIGHTING, INC.

New York

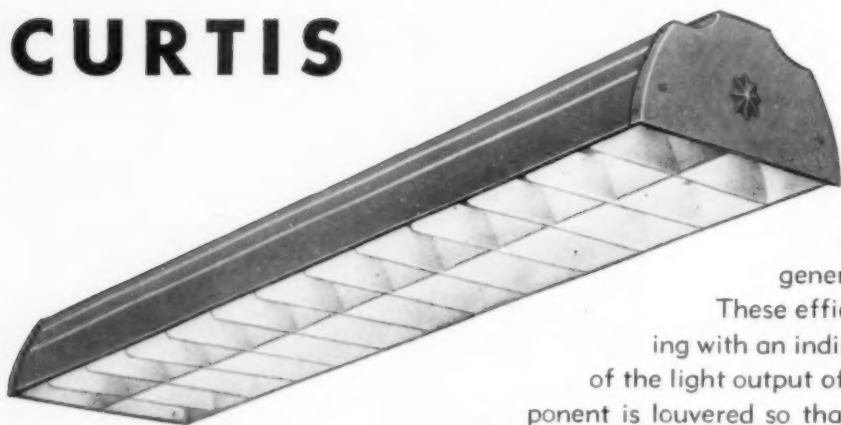


6135 W. 65th St., Chicago 38, Ill.



Toronto

## CURTIS



## FORTY-SIXTY SERIES

### Fluorescent Luminaires

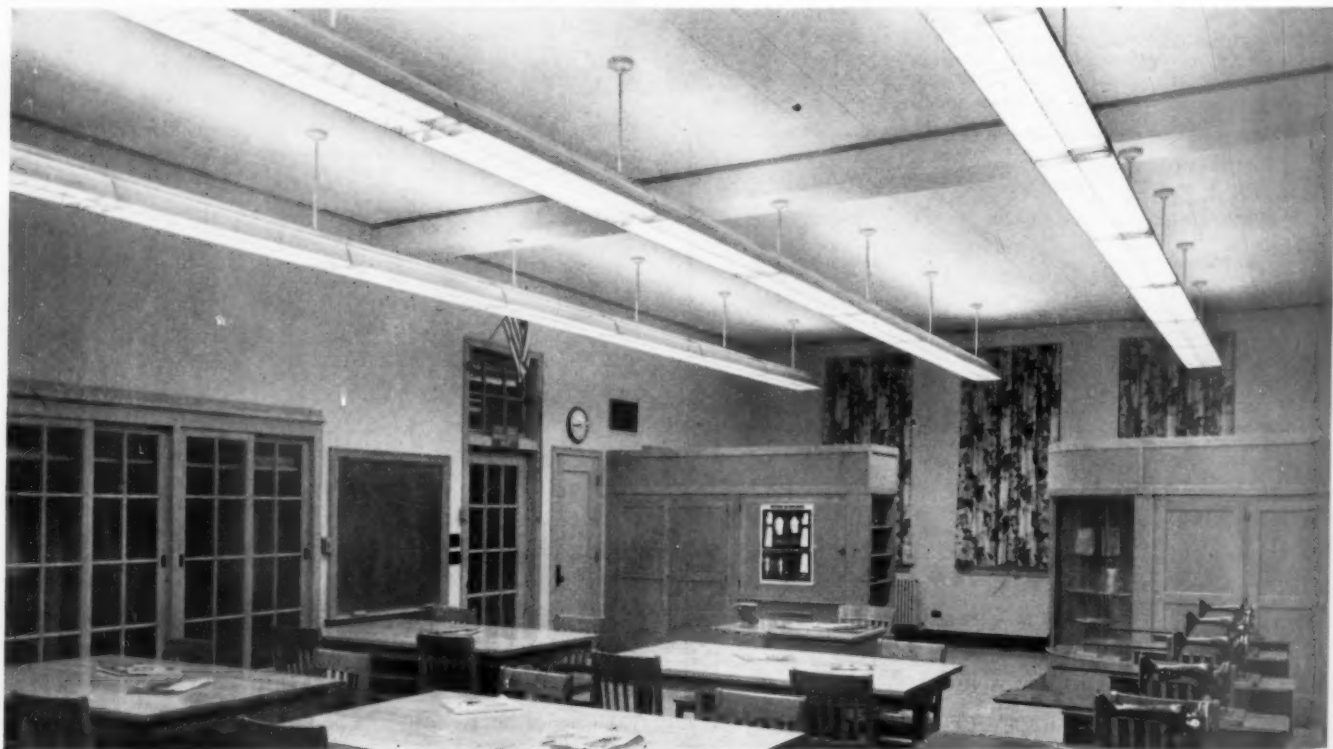
Curtis "Forty-Sixty" series fluorescent luminaires are designed and engineered to provide unexcelled general illumination for today's class room.

These efficient lighting units illuminate the ceiling with an indirect component of approximately 40% of the light output of the luminaire. The 60% direct component is louvered so that the maximum brightness within the shielded zone does not exceed 1.0 candles per square inch. The low-brightness of "Forty-Sixty" series luminaires blends with the illuminated ceiling making it possible to attain high levels of quality illumination without annoying glare.

Side reflectors and louver fins are finished in durable Alzak Aluminum. Steel wiring channel is finished baked white "Fluracite". The louver is hinged so that it may be opened from either side for cleaning and relamping. Maintenance is kept at a minimum as there are no horizontal reflecting or diffusing surfaces to collect dust.

*Typical school installation with Curtis "Forty-Sixty" luminaires*

**Complete technical specifications and illumination data are available and will be sent on request.**



THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

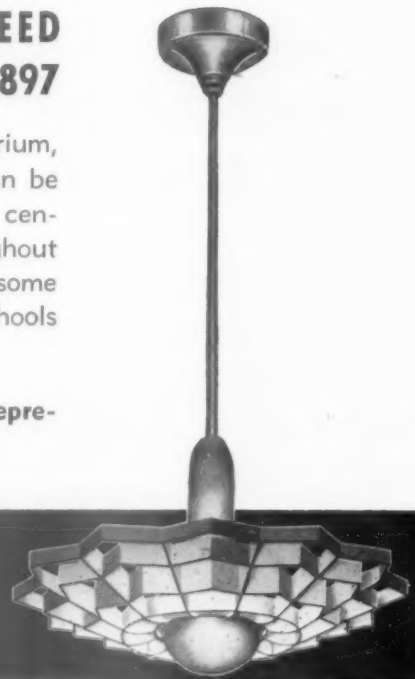


## CURTIS LIGHTING...FOR EVERY SCHOOL NEED CURTIS HAS BEEN DESIGNING QUALITY LIGHTING SINCE 1897

In every phase of school lighting, whether it be the classroom, auditorium, gymnasium, principal's office or school corridor, Curtis luminaires can be depended upon to provide quality illumination. For more than half a century Curtis luminaires have been installed in schools of all types throughout the country. The Curtis roster of school lighting installations includes some of the largest universities and colleges in the country as well as many schools in small rural districts.

**Whatever your lighting problem may be, there is a full-time Curtis representative near you for consultation.**

# CURTIS SNO ❄️ FLAKE



Curtis "Sno-Flake" illustrated above and shown in a typical classroom installation at the right presents an entirely new concept in design for indirect incandescent illumination.

The open pattern of the shallow die-cast one-piece aluminum louver completely shields the neck of the silvered bowl lamp at normal viewing angles. The open design of the louver also permits dust and small objects to fall through, keeping maintenance costs at a minimum.

"Sno-Flake" utilizes one 300 or 500 watt mogul base silvered bowl lamp and is designed with the idea of economy in initial cost and economy in installation and maintenance.

**Complete information is given in our special bulletins. Write for them.**



**THE AMERICAN SCHOOL AND UNIVERSITY—1950-51**

# GENERAL ELECTRIC COMPANY

APPARATUS DEPARTMENT

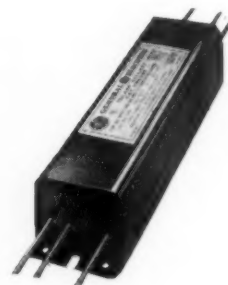
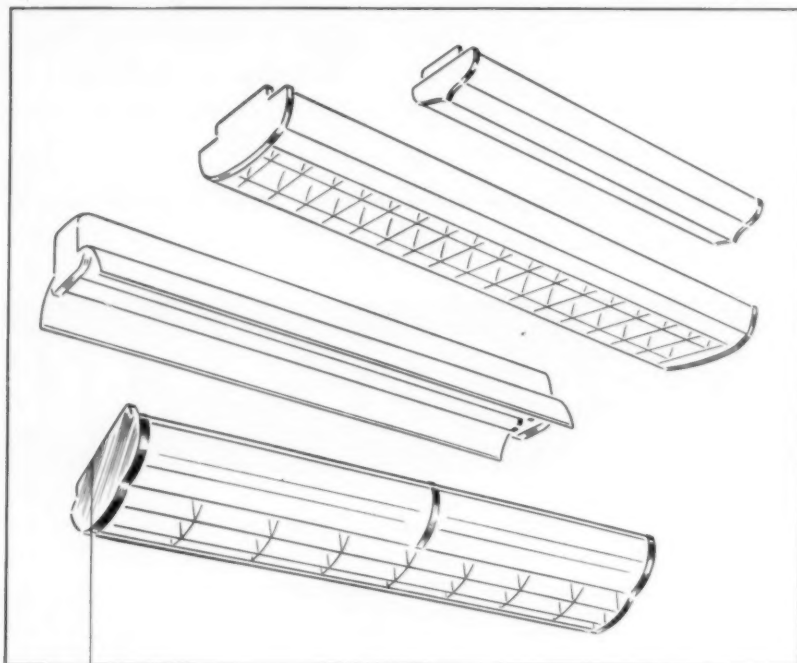
Schenectady 5, N. Y.

## MAKE SURE

*The Fluorescent Fixtures for Your School Lighting*

## WEAR

## THIS TAG



Keep an eye out for this tag when your school is in the market for fluorescents. It means the fixture is equipped with a General Electric ballast — outstanding in the industry. It is your assurance of rated lamp life and maximum light output, of quiet and dependable operation.

All G-E ballasts are designed, built, and tested for permanent lamp-matched characteristics. They get the most out of standard fluorescent lamps — give you the quality and economy you are looking for in fluorescent lighting. A complete line of G-E ballasts is available for virtually any educational fluorescent-lighting application. For further information, write the Apparatus Department, Section 640-257, General Electric Company, Schenectady 5, N. Y.

FLUORESCENT LAMPS do not draw current directly from the lighting circuit as do filament-type lamps. Instead, they are operated by a transformer or ballast — especially and carefully designed for the purpose.

With fluorescent lighting, therefore, the amount of light you get from the lamps, the life of the lamp, and to some extent the life and efficiency of the fixture itself, depend to a large measure upon the characteristics of the ballast. Good ballasts mean better, more economical lighting.

# GENERAL ELECTRIC

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# THE EDWIN F. GUTH COMPANY

2615 Washington Avenue St. Louis 3, Missouri



## FLUORESCENT AND INCANDESCENT LIGHTING

Specialized Equipment for Every Institutional Lighting Need—  
Precision-Planned for Economical Installation and Maintenance

### —featuring new GUTH 4-FT. SLIMLINE SYSTEM

available in every GUTH 2 and 4 40-W fluorescent fixture

- no starters or starter troubles — light in two steps almost instantly.
- single-pin lamps even easier to change than incandescent bulbs — lowest maintenance in fluorescent history!

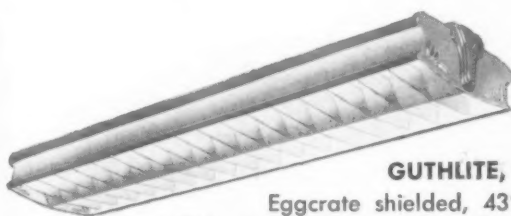
### FLUORESCENTS:

A wide variety to choose from: glass diffusing, lamp shielding (Eggcrate types), totally indirect, luminous indirect and exposed lamp types. Here are a few typical models:



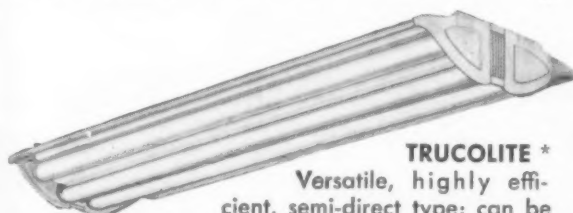
#### GUTHLITE \*

Revolutionary "Jackknife Hinge" Luminaire that swings down for easy relamping and cleaning right from the floor! For 2 40-W or 2 85-W or 2 4-FT. SLIMLINE lamps; ceiling or suspension, unit or continuous mounting. Simplest fixture of all to install and service. Bulletin 845-U.



#### GUTHLITE, JR. \*

Eggcrate shielded, 43% uplight, 57% downlight. For 2 or 4 40-W or 2 85-W lamps. Similar SLIMLINE, JR.\* for 2 and 4 4-ft. or 8-ft. SLIMLINE lamps. Ceiling or suspension, unit or continuous mounting. Bulletins 858-U and 859-U.



#### TRUCOLITE \*

Versatile, highly efficient, semi-direct type; can be used open, with Eggcrate louvers or diffusing glass bottom. For 2, 3 or 4 40-W lamps—also 2 and 4 4-ft. or 8-ft. SLIMLINE lamps. Ceiling or suspension, unit or continuous mounting. Bulletins 814-U and 852-U.

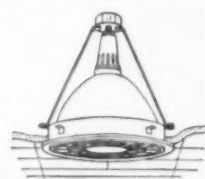
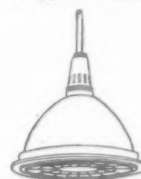
### INCANDESCENTS:

GUTH Incandescents include a wide variety of designs with super-efficient, permanent ALZAK Aluminum reflectors. Direct, Indirect and Semi-Indirect types; also High and Low-Bay Gym Reflectors, Exit and Utility Lighting units. Here are typical models:



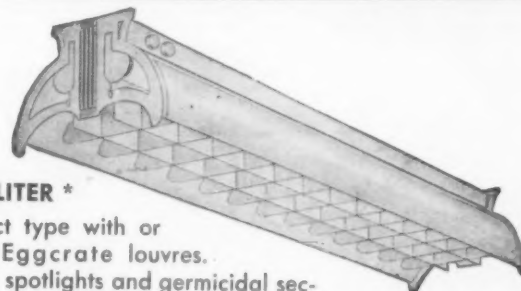
#### SEELUX \*

Indirect type with 3-ring spun aluminum concentric louvers in heatproof ALZAK finish for lifetime beauty and efficiency. Open bottom minimizes maintenance; Silverbowl lamp provides built-in reflector. Bulletin 864-U.



#### HIGH-BAY GYM LIGHTS

Recessed or Exposed types with permanent ALZAK Aluminum reflectors, heavy wire guard, with or without concentric louvers. Both types may be relamped from below; recessed types hinged to service from above. Bulletin 867-U.



#### FUTURLITE \*

Semi-direct type with or without Eggcrate louvers.

"Hy-Liter" spotlights and germicidal sections to match. For 2 or 3 40-W or 2 4-FT. SLIMLINE lamps ("Eye-to-the-Future" lighting — 3rd lamp can be added later to 2-lamp model); ceiling or suspension, unit or continuous mounting. Bulletin 816-U.



## LIGHTING

THE EDWIN F. GUTH COMPANY • St. Louis 3, Missouri  
Leaders in Lighting since 1902

A REALLY COMPLETE LINE TO CHOOSE FROM

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



# HOLOPHANE COMPANY, INC.

342 Madison Avenue  
New York 17, N. Y.

**GUIDE to LIGHTING EDUCATIONAL INSTITUTIONS**

**COMPLETE!...JUST OFF THE PRESS!**

**NEW!...**

**available  
without  
charge**



## 52 PAGES OF AUTHORITATIVE INFORMATION AND DESIGN DATA

Showing the Application of ILLUMINEERING\*  
to the Lighting of Educational Spaces

This comprehensive guide to Lighting should be read by all school authorities, architects, engineers, and by everyone who is currently concerned with achieving the proper environment and visual conditions for education.

Holophane Engineering Service, recognized lighting authority for over 50 years, indicates the methods of providing effective, economical school lighting. Thirty-five engineering drawings in complete detail show the scientific solution to individual school lighting problems.

Write now for this book on your firm or institution letterhead. It is available to you without charge.

\* Reg. U. S. Pat. Off.

Some of the features in this important book are Light Control Systems and Application Data for . . .

- |                          |                  |
|--------------------------|------------------|
| ● Study Halls            | ● Blackboards    |
| ● Kindergartens          | ● Stair Areas    |
| ● Administrative Offices | ● Dining Rooms   |
| ● Classrooms             | ● Outdoor Areas  |
| ● Work Shops             | ● Kitchens       |
| ● Chapels                | ● Storage Space  |
| ● Swimming Pools         | ● Laundries      |
| ● Laboratories           | ● Libraries      |
| ● Medical Rooms          | ● Music Rooms    |
| ● Auditoriums            | ● Art Rooms      |
| ● Corridors              | ● Drafting Rooms |
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**HOLOPHANE ENGINEERS HAVE DESIGNED A UNIT for EVERY SCHOOL NEED**

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



Science Lecture Room . . . Recessed HOLOFLUX \*



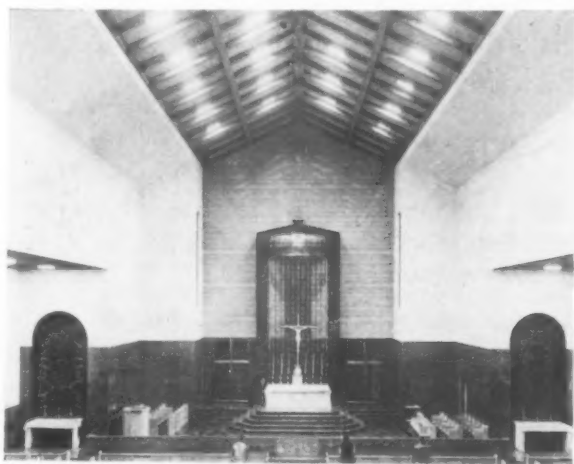
Sewing Room . . . Recessed HOLOFLUX in Strips

## HOLOPHANE Planned LIGHTING for Every Scholastic Activity

Holophane creates effective lighting for every phase of school activity. Better illumination means better vision, increased safety and greater efficiency for both teachers and pupils. Holophane has designed a specific unit for each play or work area of the modern school or college. Holophane Engineering Staff may be consulted without obligation, on any school lighting project.



Cafeteria . . . with surface-attached CORRECTALITE \*



College Church . . . IN-BILT

\* Reg. U. S. Pat. Off.



Gymnasium . . . Recessed HOLOFLUX

# HOLOPHANE COMPANY, INC.

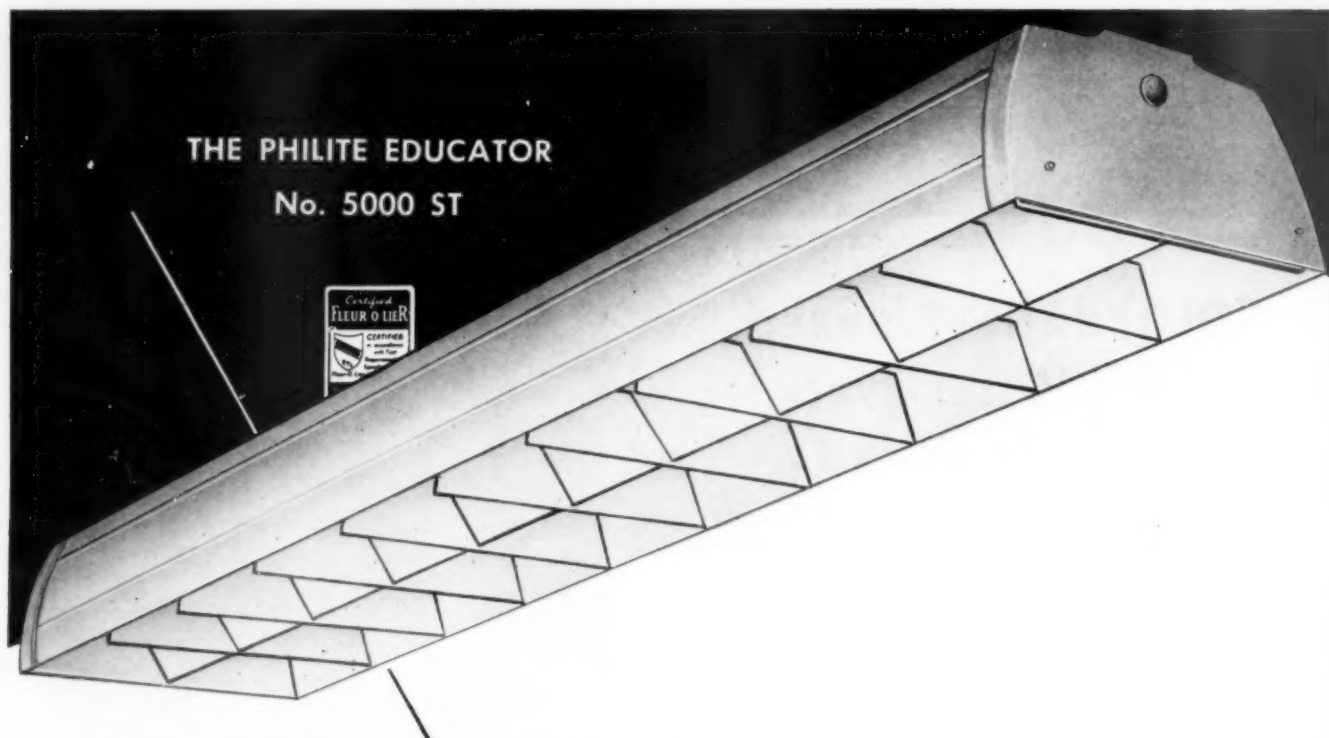
Lighting Authorities Since 1898 • 342 MADISON AVENUE, NEW YORK 17, N. Y.

THE HOLOPHANE COMPANY, LTD., THE QUEENSWAY, TORONTO 14, ONTARIO

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# RUBY-PHILITE CORP.

32-02 Queens Blvd.  
Long Island City 1, N. Y.



***PHILITE offers ideal school lighting . . .***



**SERIES 5000**  
**2 lamp**

Available in 3 types: Steel sides,  
Plastic sides, Glass sides; for 48"  
and 96" Slimline lamps and for  
48" fluorescent lamps.

Philite School Lighting is now available to  
Architects, Engineers and School Boards  
throughout the country.

Write for your copy of the new Philite  
Catalog. This comprehensive volume pre-  
sents the Philite Story and a wealth of  
illustrations and detailed engineering  
data on Philite Lighting Products.

*Ruby-Philite Corp.* 32-02 QUEENS BLVD., LONG ISLAND CITY 1, N. Y.

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## THE PHILITE PRINCIPAL

No. 1118



*... on a scientific engineering basis.*

The headquarters of Ruby-Philite Corp. is staffed with an experienced Engineering and Design Department. Their services are offered freely whenever you have a lighting problem.

We invite your inquiries. Philite Field Engineers are always available to discuss the lighting requirements of your school.



No. 1118  
2 and 4 lamp

Available with Luminous steel or Plastic sides; for 48" and 96" Slimline lamps and for 48" fluorescent lamps.

*Ruby-Philite Corp.* 32-02 QUEENS BLVD., LONG ISLAND CITY 1, N. Y.

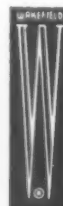
# THE F. W. WAKEFIELD BRASS COMPANY

Yearwood Park

Vermilion, Ohio

Over 42 Years in the Manufacture of Lighting Equipment

DISTRIBUTORS IN OVER 200 CITIES



## Class mates...

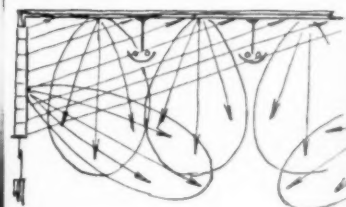
### Wakefield and The Coordinated Classroom

*In installation after installation, Wakefield lighting equipment has shown its ability to meet the requirements of the Coordinated Classroom developed by Darell B. Harmon.*

Harmon's first experiments at Rosedale School in Austin, Texas, proved the peculiar fitness of Wakefield luminaires, and ever since, wherever the Coordinated Classroom has been installed, or has been presented at School Lighting Clinics, the artificial lighting has always been: **WAKEFIELD.**

During recent years while this revolutionary concept was being demonstrated to educators, architects, lighting engineers and the medical profession, Wakefield lighting specialists were setting up demonstration classrooms in all parts of the country, and in the process acquiring a considerable store of practical experience which is available, without any obligation, to school officials. For definitive information and assistance, and for the name of the Wakefield lighting specialist nearest you, write to

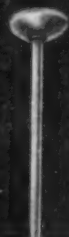
**THE F. W. WAKEFIELD BRASS COMPANY — VERMILION, OHIO**



#### On Lighting the Coordinated Classroom According to Harmon

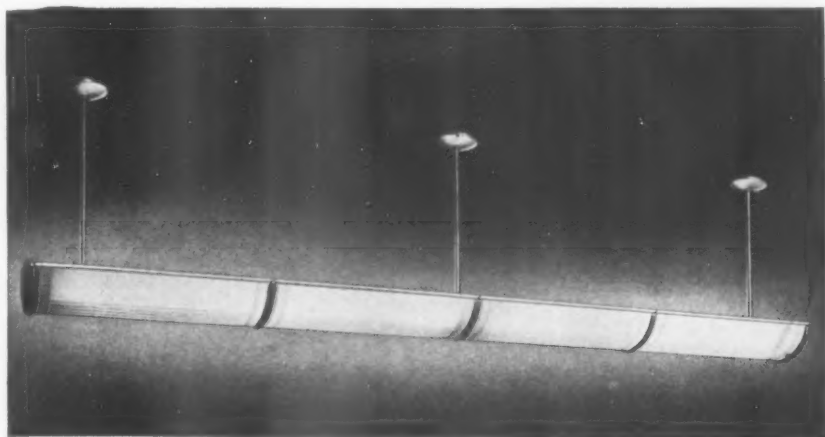
For **OPTIMUM LIGHTING**, providing a "smooth" distribution of light on horizontal, vertical, and other plane working surfaces—well inside contrast and other tolerances of the eyes—but also providing adequate modeling shadows for three-dimensional seeing—the room must be illuminated as a "light solid" with the light apparently coming, by diffuse transmission or reflection, from above working eye level. The ceiling should seem to be the primary source, with the upper portion of walls or windows making the apparent secondary sources, increasing in brightness in an upper direction to blend with ceiling brightnesses.

The STAR is a finely engineered, ruggedly built unit with great ultimate investment value because its efficiency remains high for many years with minimum, economical maintenance.



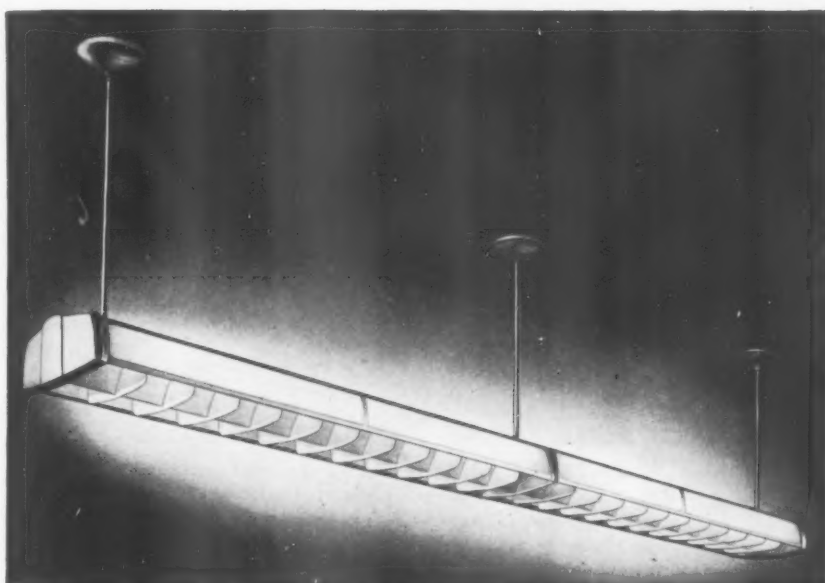
The Wakefield STAR is a luminous indirect fluorescent luminaire which provides the three dimensional distribution of light recommended by Harmon.

## The Wakefield STAR



Used with marked success in child-conditioned classrooms, the STAR is a luminous indirect lighting unit with a molded translucent Plaskon reflector of such density that the lighted luminaire is of approximately the same brightness as the illuminated ceiling. Thus it provides an even distribution of light intensity all over the room, with no deep shadows or sharp contrasts and without distracting glare from the light source. Each 4' section utilizes two 40W fluorescent lamps. (Latest development in Star design makes it available for use with four 8' Slimline lamps.)

## The Wakefield GRENADIER II



Particularly recommended for classrooms, the GRENADIER II has a specially designed louver which diffuses the light efficiently and masks the surface brightness of the lamps. Plastic side panels and optional top reflector plates permit controlling the upward and downward components of the light. Grenadiers are available for use with two or four 40W fluorescent lamps per 4-foot section—or with two or four Slimline lamps per 8-foot section.

## The Wakefield COMMODORE

This luminous semi-indirect incandescent luminaire, a popular Wakefield classroom unit, is manufactured in a complete series for wattages from 200W to 750W. The molded white Plaskon reflectors vary in wall thickness to insure uniformity of brightness for the various lamp sizes. The hangers are made of aluminum, and finished in satin aluminum. (Shown at right).

For information and assistance on your classroom lighting problems please write to The F. W. Wakefield Brass Company, Vermilion, Ohio.



*Wakefield*



**Over-ALL Lighting**

**A BASIC CLASSROOM TOOL**

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



# SYLVANIA ELECTRIC PRODUCTS INC.

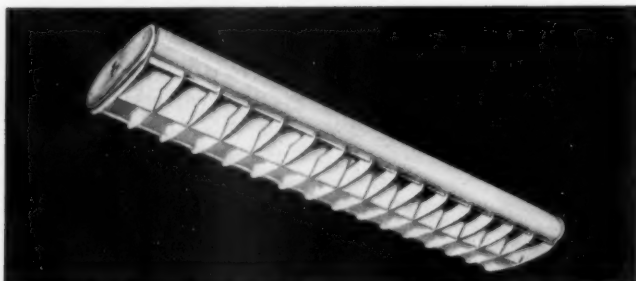
Lighting Division: 1740 Broadway, New York 19, New York

*Introducing the ideal fixtures for every school-lighting need...*

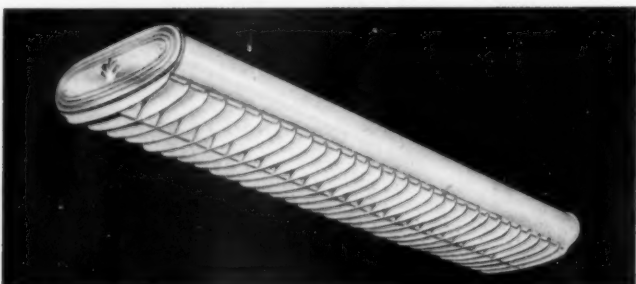
## SYLVANIA'S NEW TRIMLINE SERIES

These fixtures are engineered to meet the most exacting requirements. Their light is extremely efficient... clear and bright without glare.

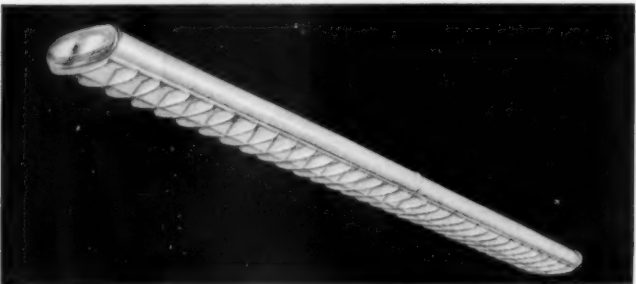
Attractively designed with translucent side panels and decorative end caps, these Trimline fixtures harmonize with modern school architecture. Easy to install and most economical to maintain.



**CL-242.** 2-lamp, 40-watt, Standard Start, 4-foot unit. Can be surface or pendant mounted. Reflector and louvers finished in Sylvania "Miracoat" white. Satin aluminum end caps.



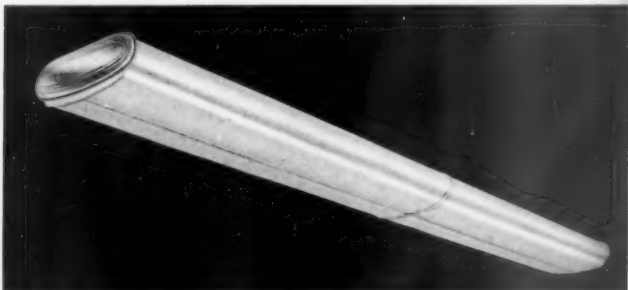
**CL-242-45.** Same fixture as the CL-242, except it is equipped with 45° longitudinal shielding. This fixture also available with Instant Start lamps, under catalog number CL-243.



**CL-283.** The 8-foot fixture, with two 96-inch, T-12 Instant Start fluorescent lamps that go on at a flick of the switch. No waiting, no flashing. Especially recommended for continuous row lighting. Also available with 45° shielding.



**CP-242.** This fixture is built to accommodate two, 4-foot Standard Start Sylvania Fluorescent lamps. The all plastic shielding provides low brightness and conforms to the American Standard Practice for classroom lighting.



**CP-283.** 8-foot Trimline fixture equipped with two, 96-inch Instant Start lamps. Plastic shielding guaranteed in writing for a period of five years. These fixtures are also available with 4 lamps where higher light intensities are required.

### New Sylvania "Triple-Life" Fluorescent Lamps expand your lighting dollar.

Sylvania lamps now last 3 times longer than previously rated (new rating, 7500 hours... old rating 2500 hours.) Recent life tests have proved that in schools these new lamps need replacement only once in 6 years. Thus, you save in the cost of lamps and labor for replacement. For full information address Sylvania Electric Products Inc., Dept. L-5508, 1740 Broadway, New York 19, N. Y.



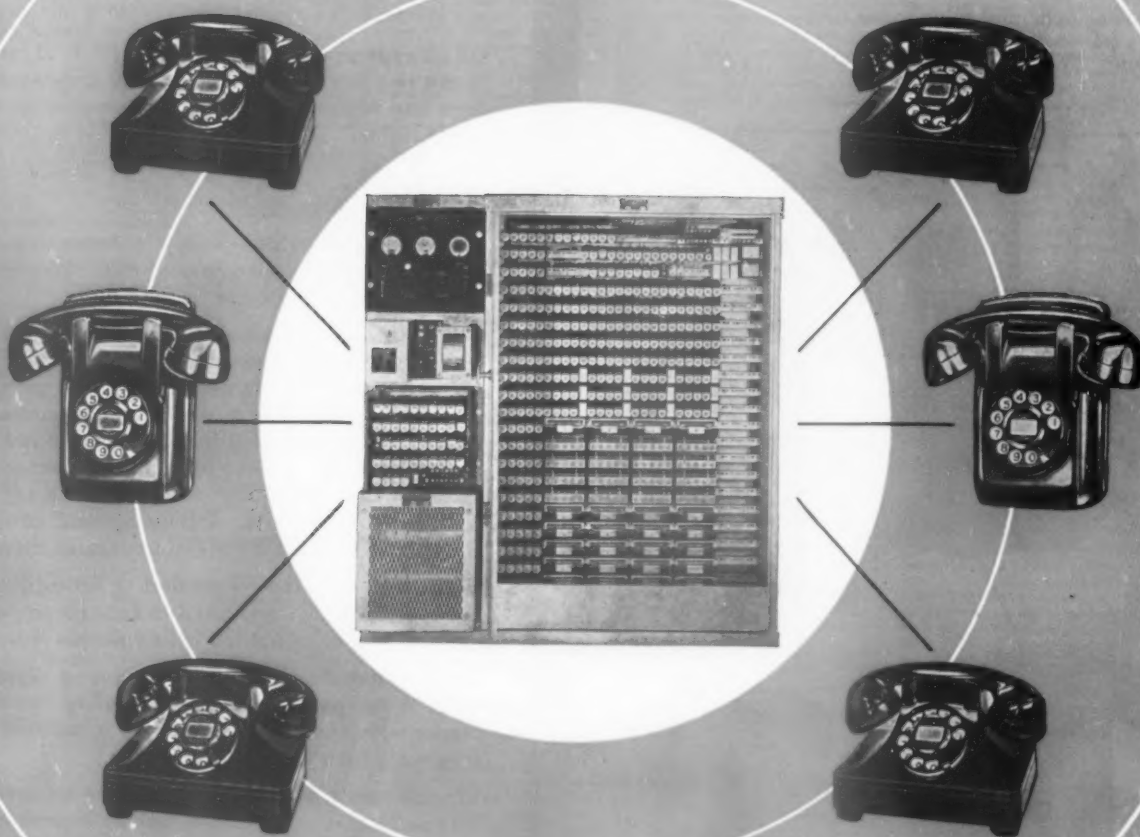
## SYLVANIA ELECTRIC

FLUORESCENT LAMPS; FIXTURES; SIGN TUBING; WIRING DEVICES; LIGHT BULBS; RADIO TUBES; TELEVISION PICTURE TUBES; ELECTRONIC PRODUCTS; ELECTRONIC TEST EQUIPMENT; PHOTOLAMPS; TELEVISION SETS

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

N O R T H

*"All-Relay"... Automatic*  
**Telephone Systems**



**THE NORTH ELECTRIC MANUFACTURING CO.**

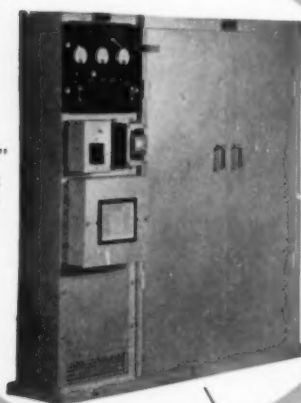
**GALION, OHIO • U.S.A.**

# NORTH

## "All-Relay"... Automatic Telephone Systems

North privately-owned telephone systems provide automatic, 24-hour inter-office or inter-plant communication without a switchboard operator and independent of the public telephone switchboard. They have no connection with the public telephone system. Ideal for installation in business offices, factories, hospitals, schools, etc. Each type consists of a central automatic switchboard, power unit, dial telephones and wiring.

"All-Relay"  
Automatic  
Exchange



Wall Telephone



Desk Telephone

### Capacities

There is a North Telephone System to fill any interior communication requirement within the range of 10 to 20,000 telephones—employing from 10 to 10,000 lines, and from one to four digit telephone numbers. Types are available to handle from two simultaneous conversations to as many as needed.

### Advantages

Fast, automatic, reliable, inter-office communication—

- Saves time by placing the organization at your finger tips,
- Saves steps, and
- Accelerates production.

Twenty-four hour secret service without a switchboard operator. No monthly rental bill—system is purchased at time installation is made. Removal of all internal calls from public switchboard. This results in:

- Unquestioned priority for outside telephone service,
- Minimum operator expense because
- Operator's attention confined to outside calls,
- Low number of rented extensions for outside service, and
- Better control of non-business usage of outside telephone.

### Standard Features

On all systems excepting the type PX-1 all conversations are secret to the two lines connected on any given call. General specifications and features available are listed for each system in the chart at the right.

### Special Features Available

**Direct Line Service**—Two telephones are directly connected at all times. It is not necessary to dial. Simply lifting the receiver at one end signals the other telephone.

**Code Call**—A complete automatic paging service. A call is originated at any telephone on the system by dialing a special number. A code is then transmitted through the plant or offices by means of a series of audible or visual signals so arranged as to be within sight or hearing at any location. The coded party upon recognizing his code can answer from any convenient telephone by dialing the code answer number and immediate connection is established with the calling party. This equipment can be furnished in sizes capable of sending out six, thirty-six, or one hundred codes.

**Executive Service**—Provided at no additional cost. Permits an executive's line so equipped to connect to the party called regardless of whether or not the called station is busy.

**Conference Service**—Furnished at a slight additional cost—enables a number of parties, by dialing the conference number, to confer with one another over the telephone system as easily as if they were face to face.

**Watchman's Service**—A complete supervisory night watchman's service feature is available making a printed record of the watchman's calls, time and location. This service is furnished over the Private Automatic Exchange telephones without additional house wiring.

**Emergency Alarm Service**—Can be included if desired.

### Fire Reporting and Recording Systems

### To Make a Call

Simply lift the receiver, listen for the dial tone, then dial the required number. The called party's bell is selected, rung instantly and intermittently until the call is answered or abandoned. If the line is in use, a busy tone sounds. When a call is answered, ringing is immediately stopped and the line cleared for conversation.





# INTERCOMMUNICATING TELEPHONE SYSTEMS

## Equipment

**Telephones**—Supplied in standard black handset desk or handset wall types equipped with North dials—in colors at extra cost. These telephones are identical with those furnished by the North Company for use in public communication systems. They are of the most advanced technical design and are modern and pleasing in appearance.

**Switchboard Exchange**—The automatic switchboard apparatus features simple, sturdy, single-motion electrical relays throughout as a basis for dependable, trouble-free years of operation. Various sizes of exchanges are available to handle from 10 to 10,000 lines.

**Power Unit**—A battery eliminator or storage battery with charger operating from commercial 115 volt, 60 cycle a-c. is furnished to supply the North System with 24 or 48 volts d-c.

**Cabinet**—Dust-proof, lacquered steel cabinet houses the switchboard exchange and in most cases, the power unit.

## Installation

Installation conforms to standard telephone practice. Exchange unit comes completely assembled in cabinet and must be placed in a dry, reasonably dust-free location. Each telephone requires a single pair to cabinet (plus common ground for two party line). Wires may be twisted pairs or cable (lead covered in locations subject to dampness). Conduit should be provided where mechanical hazards exist. Outdoor lines should be equipped with approved protectors.

## Maintenance

No specially trained personnel is needed for maintaining the North System. There are no complicated mechanisms in the switchboard—only simple electrical relays. Once assembled, adjusted and correctly installed, they will retain their adjustment and assure uninterrupted service. Lubrication, cleaning and repairs are not required—just a periodic inspection.

## Inspection Service

A periodic inspection service is available at reasonable rates if desired. Service men stationed at key points in the United States are on hand at all times for emergency service.

## Change and Expansion

Because of the simplicity of the wiring, easy relocation of telephones and expansion is possible at low cost. In case a larger system than the one originally installed becomes necessary, the wiring and telephones need not be replaced. Expansion of the larger systems is unlimited.

## Selection

	PX-1	PX-30	PX-80
<b>Capacity</b>	10 to 100 lines, 1 simultaneous conversation.	30 lines, 6 simultaneous conversations, may be equipped as required.	80 lines, 7 simultaneous conversations, may be equipped as required.
<b>Standard Features</b>	Selective ring, common talking, 2 digit numbers.	Selective ring, secret service, 2 digit numbers, busy tone, premature false impulse correction.	Selective ring, secret service, 2 digit numbers for single party, 3 digit numbers for 2-party service, busy tone, premature false impulse correction, guard against simultaneous selections.
<b>Special Features</b>	Code call, secret stations, group ringing master dial station with dialless stations.	Code call, watchman's service with or without clock, conference service, executive line service, 2-party selective service, secretarial service.	Code call, watchman's service with or without clock, conference, direct line, executive right-of-way, 2-party selective service.
<b>Power</b>	Operated from 24 volts, d-c. furnished from storage battery with self-regulating dry disc charger or battery eliminator operating from commercial a-c. Battery, charger, or eliminator is mounted separately.	Operated from 24 volts, d-c. furnished from storage battery with self-regulating dry disc charger, or battery eliminator operating from commercial a-c. Battery and charger or eliminator can be mounted in switchboard cabinet.	Operated from 48 volts, d-c. furnished from storage battery with self-regulating dry disc charger operating from commercial a-c. Battery eliminator may be used if desired.
<b>Cabinet</b>	24 in. high, 12 in. wide, 9 in. deep for wall or desk mounting, finished in gray lacquer.	54 in. high, 36 in. wide, 12 in. deep with power mounted elsewhere. Power may be mounted in base of switchboard cabinet 80 in. high, 36 in. wide, 12 in. deep. Finished in gray lacquer. Doors front and rear.	80 in. high, 36 in. wide, 12 in. deep, doors front and rear, finished in gray lacquer. Separate power panel for mounting lamps, charger, ringing equipment, 80 in. high, 15 in. wide, 12 in. deep.
<b>Lines</b>	1 individual wire to each station plus 1 common pair.	2 wires from each telephone to switchboard. 2-party lines require common ground return.	2 wires from each telephone to switchboard. 2-party lines require common ground return.
	PX-100	PX-200	PX-1000
<b>Capacity</b>	100 lines, 10 or more simultaneous conversations, may be equipped as required. Expandable by addition of necessary equipment.	200 lines, 19 simultaneous conversations, may be equipped as required. Expandable by addition of necessary equipment.	100 to 1000 lines, 10 or more simultaneous conversations, may be equipped as required.
<b>Standard Features</b>	Selective ring, secret service, 3 digit numbers, busy tone, premature false impulse correction, guard against simultaneous selections.	Selective ring, secret service, 3 digit numbers, busy tone, premature false impulse correction, guard against simultaneous selections.	Selective ring, secret service, 3 digit numbers, busy tone, premature false impulse correction, guard against simultaneous selections. In groups equipped for 2-party service, 4 digit numbers are required.
<b>Special Features</b>	Code call, watchman's service with or without clock, conference, direct line, executive right-of-way, 2-party selective service.	Code call, watchman's service with or without clock, conference, direct line, executive right-of-way, 2-party selective service.	Code call, watchman's service with or without clock, conference, direct line, executive right-of-way, 2-party selective service.
<b>Power</b>	Operated from 48 volts, d-c. furnished from storage battery with self-regulating dry disc charger operating from commercial a-c. Battery eliminator may be used if desired.	Operated from 48 volts, d-c. furnished from storage battery with self-regulating dry disc charger operating from commercial a-c. Use of battery eliminator not recommended.	Operated from 48 volts, d-c. furnished from storage battery with self-regulating dry disc charger operating from commercial a-c. Use of battery eliminator not recommended.
<b>Cabinet</b>	80 in. high, 72 in. wide, 12 in. deep, doors front and rear, finished in gray lacquer. Separate power panel for mounting lamps, charger, ringing equipment, 80 in. high, 15 in. wide, 12 in. deep. Additional units have same dimensions.	80 in. high, 72 in. wide, 12 in. deep, doors front and rear, finished in gray lacquer. Separate power panel for mounting lamps, charger, ringing equipment, 80 in. high, 15 in. wide, 12 in. deep. Two additional units each 80 in. high, 72 in. wide, 12 in. deep are required for full capacity of 19 links.	One cabinet, 80 in. high, 72 in. wide, 12 in. deep, and one cabinet, 80 in. high, 36 in. wide, 12 in. deep required for each 100 lines. Battery charger, ringing equipment and signals mounted on power panel.
<b>Lines</b>	2 wires from each telephone to switchboard. 2-party lines require common ground return.	2 wires from each telephone to switchboard. 2-party lines require common ground return.	2 wires from each telephone to switchboard. 2-party lines require common ground return.

## NORTH Telephone Equipment



### Advantages of the "All-Relay" Type Operation

The "All-Relay" type of automatic telephone equipment possesses a number of advantages over the mechanical switching type, all of them resulting directly from the basic principle of replacing, to the greatest possible extent, mechanical motions with electrical operations.

By such substitutions, dependability is increased, need for service is practically eliminated, more compact construction is achieved, weight is cut and susceptibility to atmospheric conditions is drastically reduced.

The "All-Relay" system functions through successive operation of banks of simple electrical relays rather than by means of the movement of a complex switching device. The only motions involved are the working of armatures on knife edge pivots, the flexing of springs and the sliding action of electrical contacts. No single part need move more than  $\frac{1}{8}$  inch, no lubrication is required, no wear can occur and each operation of the electrical contact cleans the surfaces in preparation for the next one.

The development, perfection and manufacture of telephone type relays has been a principal function of the North Electric Manufacturing Company for many years. Dependability and durability of the product are the major objectives. All materials are those which have been proved most suitable to their function; design and manufacturing processes are the result of long experience guided by a continuous program of testing and observation of equipment in operation.

Dependable operation is assured by the North Company's contact assembly baking process combined with precious metal contact points operated with a self-cleaning sliding motion. In typical tests, relays have been operated in excess of 5,000,000 times without failure. This is equivalent to 50 years of continuous operation at intervals of  $1\frac{1}{2}$  minutes.

This performance which is consistently obtained entirely without service or attention of any kind is the basis of the dependability of the North "All-Relay" Dial Automatic Switchboard.

### Company Experience

Since 1884 the North Electric Manufacturing Company has been continuously engaged in the production of precision built telephone equipment. The company, its engineering services, and its products are identified throughout the field of public communications with telephone equipment of the highest quality.

### Planning Service

We offer the assistance of our Engineering Organization without obligation to you in planning your requirements.

A complete sample specification will be furnished on request together with our recommendations for the equipment necessary to meet your conditions.



**THE NORTH ELECTRIC MANUFACTURING CO.**

**GALION, OHIO • U.S.A.**

# SCHOOLS **STANDARD** COLLEGES

## ELECTRIC CLOCK and PROGRAM SYSTEMS

### TELEPHONES — FIRE ALARMS

#### TEN REASONS

### Why "STANDARD" Systems are Always Dependable

- 1** "STANDARD" has one—and only one—synchronous motor in the entire system. Located in the Master Controller, it is of the heavy-duty industrial, slow-speed type, precision-built — and will outwear any so-called "clock" motor.

*Other* synchronous systems have 1 or 2 motors in each secondary clock, and 1 to 3 motors in the control unit. Failure of any one of the control motors would disarrange the entire system.

- 2** "STANDARD" Program Instrument keeps on running during current interruptions: bells ring correctly the instant current is resumed.

*Other* systems have a "catching-up-to-time" period during which bells may ring at wrong intervals or not at all.

- 3** "STANDARD" System has no batteries.

*Remember*, wet batteries require frequent attention; and dry batteries must be renewed at regular intervals.

- 4** "STANDARD" Master Controller Clock Dial is synchronized with the program. The two can never vary because the clock is geared directly to the program mechanism.

- 5** "STANDARD" System has the simplest arrangement for setting up program schedules. It requires two easy operations, accomplished in less than four minutes. Here they are:

(a) Punch the Program Tape for the signal periods desired. The tape is marked in hours and minutes for a 12 (or 24) hour period.

(b) Place the tape on the drum, locating it so that the time on the tape immediately below the contact fingers agrees with the time shown on the clock dial.

*That's positively all there is to it!*

- 6** "STANDARD" Program Tapes last for many years. Replacement tapes are furnished free.

*Other* systems, employing pins and lugs, require more time to change programs — miss signals when pins drop out.

- 7** "STANDARD" System permits the use of spare tapes, punched for special schedules — kept on hand and inter-changed in a minute's time.

- 8** "STANDARD" Secondary Clocks have no motors, electrical contacts or other complicated parts.

They require no cleaning, oiling, adjustment or renewal, and will last as long as the building. In fact, some "STANDARD" Secondary Clocks have been running for more than 50 years!

- 9** "STANDARD" Automatic Reset Feature covers all individual clocks — not just "group" resettings.

It has a 25-minute corrective range (fast or slow), and functions in two seconds, *silently*.

- 10** "STANDARD" Systems, item for item, are less complicated and more ruggedly built, require less service and have lower maintenance cost—than any other school program system.

THE STANDARD ELECTRIC TIME COMPANY

79 Logan Street, Springfield 2, Mass.

Branches In All Principal Cities

BULLETIN 178





# The New STANDARD

## 2-Wire Automatic Reset with POWER-OFF RESERVE

This new "STANDARD" system provides a school with the simplest, most efficient time and signal equipment on the market. It offers features obtained only through "STANDARD" equipment.

The new POWER-OFF-RESERVE keeps the program instrument running during power interruptions so that the bells will ring correctly the instant current is resumed. It is never necessary to wait for the program to "catch up" in time.

The secondary clocks are brought to agree with the master controller, to compensate for current interruptions up to 25 minutes loss of time in an hour.

### Synchronous Master-Program Controller

This new compact unit controls the program schedules and clocks for the entire school. It is operated from the lighting current by a 115V AC heavy-duty, slow speed, synchronous motor, and is provided with our new RESERVE POWER spring-driven mechanism which keeps the controller running during current interruptions. This feature keeps the program instrument on time, so that the bells will ring correctly immediately upon resumption of current — a feature found only in "STANDARD" systems.

As the hands of the 10" square time dial shown on the front are directly geared to the program mechanism, it is impossible for the two to get out of step with each other — another exclusive feature of "STANDARD."

The Controller is furnished with a 2-wire automatic reset feature so that all secondary clocks are automatically, silently and immediately (in 2 seconds) set to agree with the master controller on the 59th minute, to compensate for current interruptions up to 25 minutes in one hour. (The reset covers 25 minutes whether fast or slow and is individual for each clock — not simply "group" correction.)

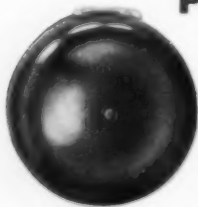
The Master-Program Controller is furnished in a flush or surface type birch case, regularly finished in natural, but other finishes can be supplied when desired.

The program instrument can be equipped for 2, 4, or 6 schedules (or circuits) of 12 or 24 hour duration as required.



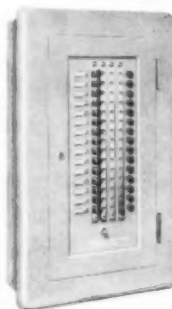
16 1/4" wide x 32-5/16" high x 8 1/4" deep

### Program Signals



Buzzers are regularly used in class rooms, being installed in the clocks; 6" vibrating gongs are recommended for corridors, cafeterias and gymnasiums. For the outside of the building 10" vibrating gongs with housings and screens or horns are regularly used.

### Bell Control Board



11 1/2" wide x 19 1/4" high x 4" deep

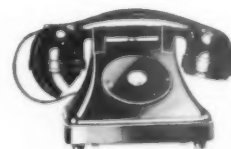
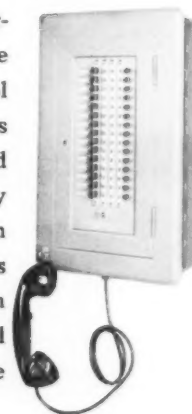
It is important to have a bell control board in every school, for the following reasons:

- (1) Any signal may be placed on any program schedule desired by simply changing the position of the plug on the board.
- (2) Any program signal may be rung manually when required.

The bell boards are furnished for flush or surface mounting as required.

### Telephone System

If a bell control board is used, a selective ringing, common talking telephone system may be installed in the school at very little expense. This involves adding a telephone instrument (hand or desk set), relay and switching key to the bell board, and installing room phones (without signals) in the class rooms and other locations. The room buzzer becomes the telephone signal by giving it two short rings from the bell board. No additional wiring, except two wires for talking circuit, is required for this simple but efficient telephone system.



# Clock and Program System

## Secondary Clocks

A few of the regular "STANDARD" secondary clocks are illustrated here. The 12" flush metal clock (FMT-12) is a handsome unit with thin rim spun aluminum case. It is the least expensive, and is the one commonly used in class rooms.

Double dial clocks (12" or 14") are suitable for corridors, and 14", 16" or 18" clocks for cafeterias and gymnasiums (the latter with shatter-proof glass).



### ROUND METAL CASE CLOCKS

- Type FMT — flush, made with 10", 12", 14" dials
- Type RM — surface, made with 8", 10", 12", 14", 16", 18", 24" dials
- Type FM — semi-flush, made with 8", 16", 18", 24" dials

### SQUARE WOOD CASE CLOCKS

#### SQUARE DIALS (surface)      ROUND DIALS (surface)

- List SSD-10 10" dial      List S-14 14" dial
- List SSD-12 12" dial      List S-18 18" dial



- (flush)
- List FSD-10 10" dial
- List FSD-12 12" dial

### DOUBLE DIAL BRACKET CLOCKS (Metal Cases)

for side wall or ceiling mounting

- List 505 10" dials      List 508 16" dials
- List 506 12" dials      List 509 18" dials
- List 507 14" dials



### SPECIAL CLOCKS

This clock consists of plain hands, and plain 5-minute marks, which can be mounted on plaster or other flat surfaces.



Many other special clocks in various designs can also be furnished as required.

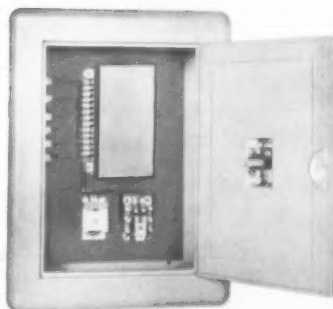
## STANDARD FIRE ALARM SYSTEMS



List 460 Control Panel  
13 3/4" wide x 17 3/4" high x 6 1/2" deep



List 456 Station



The most practical fire alarm system for a school is considered to be the "master code" type which sounds the same fire alarm code on all the signals. The chief function of a fire alarm system in a school is to vacate the building. A "coded box" system is also made by "STANDARD," but it is not so practical for a school, and the cost is much greater; such a system is required in hotels, office buildings and the like where authorized building engineers are always on hand to locate the fire and direct the fire department. For school use different box codes are more likely to cause confusion.

The closed circuit type, by its electrical supervision, is the best, for it insures that the entire system is in operative condition at all times.

The open circuit equipment is used in the smaller schools, where expense has to be kept to the minimum.

Single stroke gongs or horns are the customary types for school fire alarm signals.

## SPECIFICATION FOR A Clock and Program System for the Average School

**Clock and Program System** — Furnish and install a Standard Electric Time Company clock and program system of the automatic reset type to operate from the 115VAC building current, and consisting of a master-program controller, bell control board, buzzers, bells and secondary clocks as specified. All wiring and equipment shall be installed according to the manufacturer's instructions.

**Master-Program Controller** — This unit shall control the complete system and consist of a minute interval, 4 schedule (optional: 2 or 6), 12 hour, synchronous motor-driven program instrument with reserve power unit to keep it running during current failures so that the signals will ring correctly the instant current is resumed. No batteries of any kind shall be used in this system. Provide push buttons for manually ringing the bells when required.

It shall also have a 2-wire automatic reset device for the complete control of all secondary clocks and to reset them individually and collectively to correct time in case of current failure or other irregularities, up to 25 minutes slow or fast in any one hour.

The Master-Program Controller to be mounted in a surface (or flush) hardwood case with 10" time dial geared to the program instrument so that they can not get out of time with each other.

**Bell Control Board** — The bell control board shall be built for 15 (optional: 20, 25, 30, 35, etc.) signals, 4 program (optional: 2 or 6) schedules, so arranged that any signal in the building may be rung on any of the schedules by means of changing the position of a screw plug, and with push buttons for individual ringing of signals.

**Secondary Clocks** — All secondary clocks shall be 2-wire automatic reset minute impulse type without contacts for individual resetting from Master-Program Controller, shall be flush mounted, have 12" dials and convex glasses. (14" double dials for corridors, 14", 16" or 18" semi-flush for cafeteria and gymnasium, the latter to have shatter-proof glass.)

**Program Signals** — Classroom clocks shall be furnished with buzzers, 6" gongs in corridors (cafeteria, gym) and for outside, 10" gongs having mats, housings and screens.

**Telephone System (Optional)** — The bell control board shall be furnished with necessary equipment to combine a telephone central switchboard for common talking and selective ringing service and furnished with a hand telephone set (desk type telephone set, optional). The room phones shall be flush wall type with watch case receivers (hand sets, optional).

**Power Units** — Furnish all necessary transformers and rectifiers for the operation of above equipment.

## SPECIFICATION FOR A Closed Circuit Fire Alarm System

**Fire Alarm System** — Furnish and install a Standard Electric Time Company (Type MC-A) supervised, master code, closed circuit fire alarm system to operate from 115/230 VAC (120/208V optional)

and consisting of a control panel, break glass stations, and fire alarm gongs (horns, optional). The operating current to be taken from one side of the AC service and the supervisory from the other side.

The entire wiring of the system including the control panel, break glass stations and signals shall be under constant electrical supervision and shall be installed according to the manufacturer's instructions. In case of disarrangement of any part of the system a trouble signal on the control panel will ring until entire system has been restored to normal operative condition.

**Control Panel** — This shall be ebony asbestos mounted in a flush (surface, optional) steel cabinet with glass window over the meter. It shall contain a motor driven, automatically reset master code mechanism requiring no winding, arranged to transmit a predetermined code such as 2-3 (or other as required) to all fire alarm signals for a period of four rounds then stop. Then a trouble signal on the panel shall ring continuously until the break glass station has been restored to normal operating condition.

This panel shall also contain all supervisory box and gong circuit relays, milliammeter, bell circuit balancing resistors and terminals.

(Optional: The panel shall also contain a silencing switch and pilot light to silence the trouble signal until the break glass station has been restored.)

**Break Glass Stations** — The stations shall be furnished with proper glass breaking hammer (non-chain type) and arranged for opening the front for fire drills or testing without breaking the glass. Contacts shall be silver plated and enclosed. These stations shall be arranged for flush mounting on a single gang switch box or plastic ring cover, and painted fire alarm red. (List 456)

**Fire Alarm Signals** — The signals shall be 10" non-contact underdome type single stroke gongs arranged for series operation with not over 10 gongs on one (1) circuit.

(Optional: The signals shall be surface type vibrating horns, single or double projector, as shown on drawings.)

## SPECIFICATION FOR An Open Circuit Fire Alarm System

**Fire Alarm System** — Furnish and install a Standard Electric Time Company (Type 460) master code, fire alarm system to operate from a 24V transformer, and consisting of a control panel, break glass stations and single stroke gongs (horns, vibrating bells, optional).

When a break glass station is operated the signals shall sound a predetermined code such as 2-3 (or other as required) for a period of four rounds then stop. Then a trouble signal on the control panel shall sound until the break glass station has been restored to normal operative condition.

**Control Panel** — This shall consist of: a motor driven, automatically reset master code mechanism requiring no winding, to transmit the code as mentioned above to all fire alarm signals; trouble signal; and on the outside of door a break glass station for the mounting of fire drills. The control panel unit to be mounted in a flush (or surface) type steel or wood cabinet.

**Break Glass Stations** — Specify the same as above (closed circuit type).

**Fire Alarm Signals** — The signals shall be 10" non-contact underdome type single stroke gongs for 24V AC multiple operation.

(Optional: The signals shall be surface type vibrating horns, single or double projector, as shown on drawings.)

**THE STANDARD ELECTRIC TIME COMPANY**  
**SPRINGFIELD 2, MASSACHUSETTS**



# THOMPSON ELECTRIC MANUFACTURING CO.

1101 Power Avenue, Cleveland 14, Ohio

## LOW COST—SAFE—EFFICIENT MAINTENANCE For Overhead Lighting Fixtures



KOKOMO MEMORIAL GYMNASIUM, Kokomo, Indiana

Lighting efficiency depends upon an effective maintenance program followed with regularity. THOMPSON Disconnecting and Lowering HANGERS have been installed in this newly constructed and thoroughly modern gymnasium to provide the means for convenient, quick, safe servicing of lighting equipment at the lowest cost. As the lowered fixtures are "dead," electrical as well as cleansing hazards are eliminated.

Photo of main gym shows maintenance man cleaning a lowered fixture (Curtis Lighting, Inc.). Insert photo shows him servicing a light in balcony section, where fixtures are recessed into a false ceiling. Note man at operating station (on upper tier) from which the fixture is lowered. In this installation, hanger operating chain runs from terminal box up through wall and above ceiling to hanger assembly.

Catalog available on letterhead request. • Address Inquiries: EDUCATIONAL BLDGS. DEPT.

## THOMPSON DISCONNECTING AND LOWERING HANGERS

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

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A general service Exide Battery typical of those used in college and university Physics laboratories throughout the U. S.

## FOR LABORATORIES, FIRE ALARM, PROGRAM CLOCKS, AUTO-CALL AND INTERIOR TELEPHONES

Exide Batteries are extensively used in the laboratories of the nation's foremost scientists, industrial research engineers, schools and colleges. Their performance records are the best testimony that can be offered as to their merit for laboratory services.

The foremost characteristics of Exide Batteries are absolute dependability and sustained high voltage until end of discharge. The operation of Exide Batteries is flexible. Cell connections to the battery can be arranged so as to give any desired voltage, with a wide range in discharge rates available at that voltage. By assigning a group of cells of the battery to a definite experiment, a constant voltage is assured which is free from disturbance or interference by any outside influence.

Exide Batteries of the sealed glass jar type have been carefully designed and are carefully constructed for laboratory service. They assure exceptional long life in laboratory service. Many Exide Batteries in laboratory and industrial installations have been in constant use for 20 or more years.

Regardless of how limited your budget appropriation, an Exide Battery can be selected to meet your requirements. Moreover, the wide experience of Exide engineers and the services of our nation-wide Exide organization are at your disposal. Write to the nearest Exide office shown above for further information.

# Exide

## BATTERIES

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

## EXIDE EMERGENCY LIGHTING

### Positive Protection Against Dangers of Sudden Lighting Failures

Whether children or adults, you can never predict the actions of a crowd that is suddenly plunged into darkness. Danger is real. Danger of personal injury . . . danger to school property.

The utility companies take every precaution, but cannot control the effects of storms, floods, fires, and street accidents. Privately-owned plants, no matter how carefully planned and operated, may also have interruptions.

The only certain safeguard is an emergency lighting system that functions both *instantly* and *automatically*.

Electrical engineers agree that a storage battery, *properly maintained*, constitutes the most dependable source of emergency power. The new Exide Emergency Lighting equipment, which automatically keeps the battery properly maintained, represents the qualifications found desirable from the experience of many thousands of installations in all kinds of buildings.

During an electric service interruption, Exide Emergency Lighting Systems furnish power from a dependable Exide Battery to the lights in auditoriums, gymnasiums, corridors, exits, fire towers, stairways, engine rooms, locker rooms, swimming pools, dormitories, laboratories, etc.

Exide Batteries have been used in emergency service, by telephone, railroad and public utility companies since 1895.

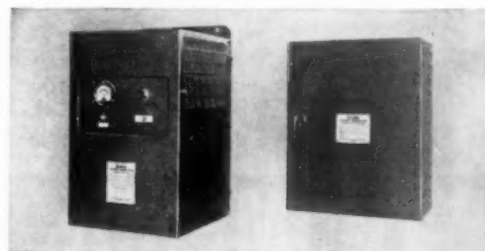
The exceptionally long life obtained from Exide Batteries used with the Exide Emergency Lighting System assures many years of dependable emergency lighting service.

## WHERE EMERGENCY LIGHTING IS NEEDED IN YOUR SCHOOL

. . . AUDITORIUMS . . . GYMNASIUMS . . . CORRIDORS . . .  
EXITS . . . FIRE TOWERS . . . STAIRWAYS . . . ENGINE ROOMS  
. . . LOCKER ROOMS . . . SWIMMING POOLS . . .  
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Automatic Control Unit

Automatic Transfer Switch Unit



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Experienced GRAYBAR Representatives and equipment Specialists perform many useful functions for the school architect, the electrical contractor, and the buyer of electrical maintenance supplies—going far beyond mere “order-taking.”



### AID IN ELECTRICAL PLANNING

GRAYBAR is fully informed on modern equipment for school lighting, communication, signaling and alarm systems. Specialists familiar with school installations in many communities will advise on choice of equipment and planning of the system you desire.



### FAST-DELIVERY SERVICE

From its nearest warehouse, GRAYBAR can deliver hundreds of electrical items promptly. That's good to remember in emergencies; often saves valuable time on everyday requirements, too. Plan ahead for delivery of scarce items on schedule. 5057

## CALL THE NEAR-BY GRAYBAR OFFICE FOR . . .

ALARM SYSTEMS • ANNUNCIATORS • APPLIANCES • AUDIOMETERS • BATTERIES • BELLS • BUZZERS • CABLE • CALL SYSTEMS • CIRCUIT BREAKERS • CLOCKS • COMMUNICATIONS • CONDUIT • CONTROLLERS • CORDS • DRY CELLS • FANS • FITTINGS • FIXTURES • FLOODLIGHTS • FLUORESCENTS • FUSES • HEARING AIDS • IRONS • INSTRUMENTS • INTER-PHONES • JUNCTION BOXES • LAMPS • LUMINAIRES • METERS • MOTORS • PLUGS • PANELBOARDS • OUTLETS • RANGES • RECEPTACLES • RECTIFIERS • REFLECTORS • SIGHTMETERS • SIGNALING • SIRENS • SOCKETS • SOUND SYSTEMS • STREET LIGHTS • SWITCHES • TAPE • TELEPHONES • TESTERS • TRANSFORMERS • TOOLS • VOLTMETERS • WIRE

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



# INTERNATIONAL BUSINESS MACHINES CORP.

**IBM**  
TRADE-MARK

590 Madison Avenue

New York 22, N. Y.

Branch Office and Maintenance Locations in Principal Cities

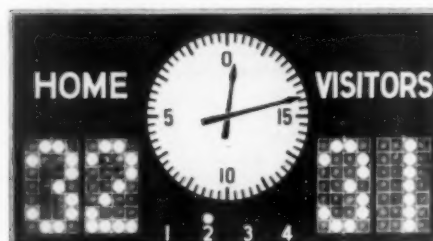
## Equipment for Schools of Every Size



### Electric Clock, Time Recording, and Time Signaling Systems

IBM Electric Time Systems coordinate activities in any school or institution. One Master Control unit regulates automatically all corridor and classroom clocks. The ceiling mounted clock illustrated is particularly adaptable for use in corridors. All bells, gongs, and buzzers — in classrooms and on playgrounds — are synchronized with the Control, providing accurate scheduling of classes, assemblies, and recreational activities.

Attendance Time Recorders are used in schools to record arrival and departure times of students, replacing daily roll calls and absentee and tardy reports.



### Electric Scoreboards

IBM Electric Scoreboards provide a fast, accurate means of indicating the official time and score at games. All-electric and operated by a press-box control, these scoreboards are made up for baseball, basketball, football, hockey, and multi-purpose use. Components, such as numeral flasher banks, timers, and controls can be furnished separately.



### Landmarks of Time

IBM Tower Clocks and outside clocks, designed to match the architectural styles of the buildings, have become "landmarks of time" on the leading banks, department stores, schools, universities, municipal buildings, industrial concerns of the country. Regulated by the same Master Time Control which controls the other time indicating, recording, and signaling equipment throughout the building, an IBM Tower Clock shows accurate, uniform time on all faces.



### Electric Typewriters

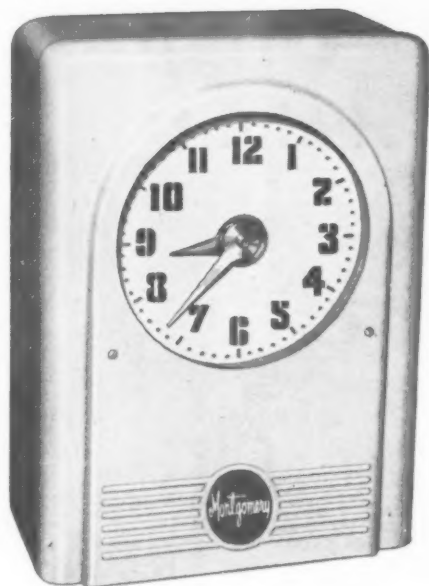
The modern school today finds IBM Electric Typewriters the right equipment on which to teach typing. Outstanding quality of work, together with ease of operation, makes them an essential part of business training. IBM Electrics are available for typing instruction purposes at a special educational price.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# MONTGOMERY MFG. COMPANY

Manufacturers of Synchronous Program Timers

Owensville, Indiana



## SPECIFICATIONS AND PRICES

The "L" series two circuit timers—illustrated above—11" x 8" x 6"—

L12 (2½-min. intervals, 12-hr. program discs) **\$104.00**  
L24 (5-min. intervals, 24-hr. program discs) **104.00**

The "M" series single-circuit timers—same appearance as "L" series—11" x 8" x 6"—

M12 (2½-min. intervals, 12-hr. program discs) **\$77.00**  
M24 (5-min. intervals, 24-hr. program discs) **77.00**

TP (5-min. intervals, 24-hr. program discs) **\$4.50**  
TS (5-min. intervals, 24-hr. program discs) **54.50**

TPC (Same as TP but with automatic calendar switch) **65.50**

TSC (Same as TS but with automatic calendar switch) **65.50**

(Shipments FOB Owensville, Ind.—Excise tax not included)

## MONTGOMERY CIRCUIT ACCESSORIES

Every satisfactory program timer installation requires the use of good grade signals. These guaranteed standard accessories are available for Montgomery Program Timers:

ATL-700 Bells, heavy duty, weather-proof for either outside or inside use:

	8 or 12 volts	24 volts	115 volts
4-inch	<b>\$31.05</b>	<b>\$20.45</b>	<b>\$27.05</b>
6-inch	<b>37.95</b>	<b>27.05</b>	<b>33.95</b>
10-inch	<b>51.50</b>	<b>40.55</b>	<b>47.45</b>

Not available for 8-volt service.

No. 161 Bells, loud ringing, for interior use only:

	6 to 12 volts	24 volts
4-inch	<b>\$4.80</b>	<b>\$6.80</b>
6-inch	<b>6.10</b>	<b>8.20</b>

No. 577 Buzzers—ample sound for classroom, volume adjustment:

6 to 12 volts	<b>\$3.70</b>	24 volts <b>\$3.70</b>
---------------	---------------	------------------------

No. 122 and 124 Horns, klaxon type, weather-proof—loud, clear tone of volume equal to that of 10-inch bell. No. 124 is two-way.

	12 volts	24 volts	115 volts
No. 122	<b>\$29.45</b>	<b>\$25.45</b>	<b>\$25.45</b>
No. 124	<b>37.95</b>	<b>33.95</b>	<b>33.95</b>

No. 110VA Transformer—for reducing 115-v., 50-60 cycle AC to 4-8-12-16 volts or to 24 volts—**\$10.05**.

Other types of signals and other operating voltages are available on special order.

Montgomery Program Timers and Circuit Accessories are available at your local school supply dealer. Please address all inquiries to Montgomery Mfg. Company, 553 West Washington Blvd., Chicago 6, Ill.

## Montgomery Program Timers and Circuit Accessories

... FOR ACCURATE, DEPENDABLE, TROUBLE-FREE AUTOMATIC SIGNALS WITH BELLS, HORNS OR BUZZERS ON 1 OR 2 SEPARATE CIRCUITS

Because of their unusual flexibility, simplicity and long life, Montgomery Program Timers are ideally suited to requirements of school time-signal systems.

**THEY ARE SIMPLE** . . . Program setting is easy. Simply set the spring clips in numbered slots on the program discs. No tools required. Installation can be made by any competent electrician.

**THEY ARE FLEXIBLE** . . . Montgomery Program Timers are available in several standard models for one and two circuits. Program discs are for either 12 or 24-hour cycles . . . and allow for even the most complicated schedule. Automatic calendar switch silences all signals for any desired regular period such as Saturdays and Sundays.

**THEY ARE ATTRACTIVE** . . . Montgomery Timers are completely enclosed in modern formed steel cases, finished in gray metalescent baked enamel. Dials are attractive, large and easy to read.

## MONTGOMERY "SPORTSTIMER"

... FOR FOOTBALL AND BASKETBALL SCOREBOARDS

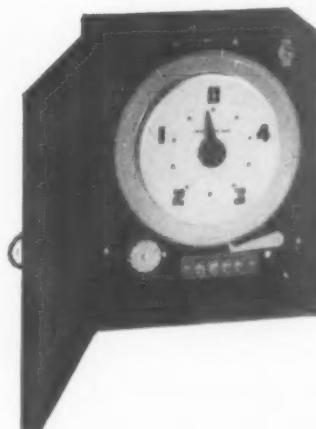
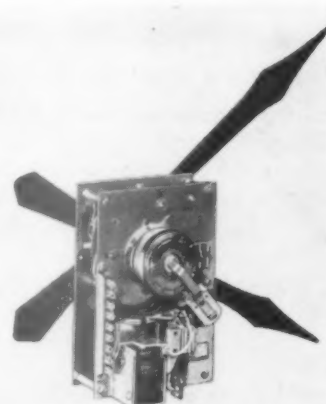
The new Montgomery SPORTSTIMER is ideal for schools, colleges and playgrounds which must operate on a limited budget. With local material and student help, scoreboards can be built at a saving of approximately 70%. Montgomery SPORTSTIMERS are shipped complete with instructions and wiring diagrams, so that installation can be done easily by anyone. Standard parts provide remote control from the sidelines. Montgomery SPORTSTIMERS can be detached for off-season storage and need no special lubrication or other care.

### BASKETBALL TIMERS

Standard Models . . . . . **\$35.50**  
Deluxe Models . . . . . **\$1.50**

### FOOTBALL TIMERS

Standard Models . . . . . **\$220.00**  
Deluxe Models . . . . . **275.00**



## NEW INDUSTRIAL TIMERS

New Type TP and Type TS Montgomery Industrial Timers provide a brass dual-disc face without the usual clock numerals, but performing the same functions. The TS Timer (applicable to most machine applications) will close a circuit at any five minute time as set up by program pin, and at a later set time will reopen it. Due to advanced design these new industrial timers are available at the remarkably low price of **\$54.50 each**.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

## THE COLUMBIA MILLS, INC.

428 South Warren St., Syracuse 2, N. Y.

*Columbia Window Shades and Venetian Blinds*

# Depend on *Columbia* WINDOW SHADES for Correct Diffusion of Light

*Scientifically Made to Cast Abundant  
Glow of Sunlite while Eliminating Glare*

Of paramount importance in the classroom are good, light-diffusing window shades. Correctly filtered sunlight is more restful to the eyes than direct rays . . . helps cut down eyestrain, fatigue and restlessness. Columbia has long specialized in shades that bring in soothing, ample light. Made to stand up to the hard usage of classrooms, Columbia shades are woven of rugged, easy-to-clean fabrics . . . and are made to operate quietly and with long-life efficiency. You will be grateful to the fine service and eye-easing properties of Columbia shades if you specify them for the classrooms in your school.

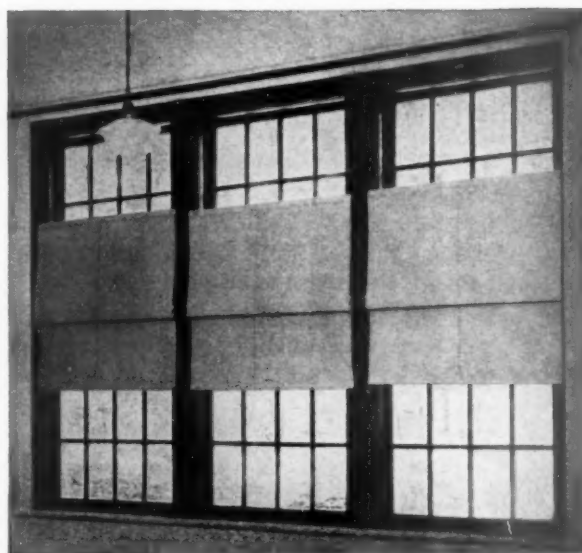
• • •

## *Smooth-Operating Columbia Venetian Blinds for School Offices*

To add beauty, as well as light and air control, Columbia's steel or aluminum slat Venetian blinds are preferred for most school offices and teacher recreation rooms. Leading schools and universities all over the country are equipped with Columbia blinds in the rooms which need attractive window coverings as well as smooth-operating efficiency. All Columbia blinds are heavily plastic-coated to resist chipping . . . to stand innumerable cleanings. You will appreciate their fool-proof mechanism, made to give years of constantly satisfactory service.

We have been making window coverings for over 50 years. Columbia Window Shades and Venetian Blinds are sold through dealers who are expert at measuring and installing shades and blinds which fit perfectly and operate with utmost satisfaction. Write for name of nearest dealer.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



*Approved for easiest adjustment. This style directs light where needed most, permits correct ventilation.*



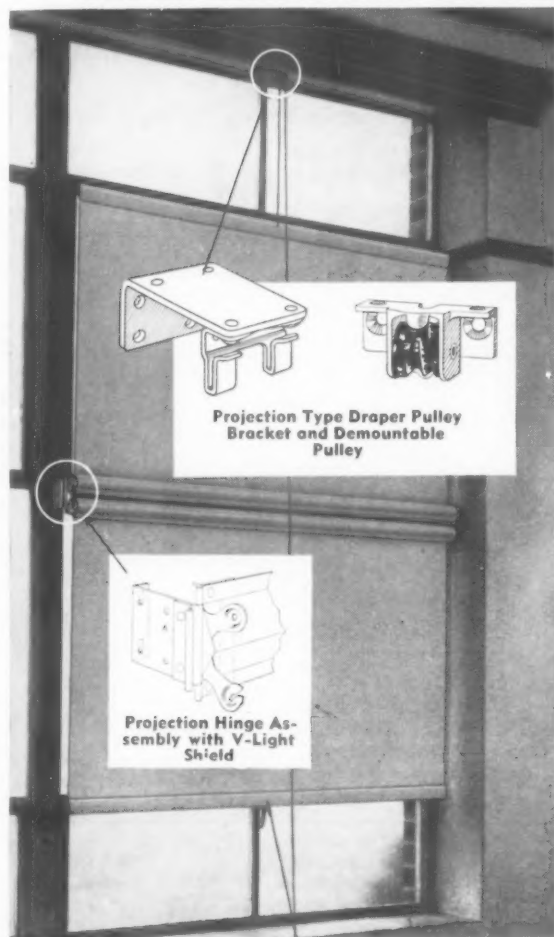
*A handsome style for offices, recreation rooms. Mechanism is concealed for greater beauty. Variety of colored tapes available.*



# LUTHER O. DRAPER SHADE COMPANY

Dept. AS-50  
Spiceland, Indiana

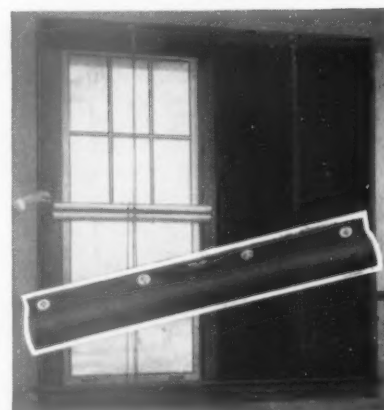
**SIZE UP YOUR SCHOOL SHADE NEEDS IN THE DRAPER LINE OF SPECIAL DESIGN**



## DRAPER VERSATILE V-DOUBLE ROLLER SHADE—FOR WOOD OR METAL SASH

Cadmium plated, demountable projection fixtures are shown above for metal sash installation. Why not have all the advantages that a completely demountable Draper installation offers?

HOW MANY of  
YOUR CLASSROOMS  
WOULD  
ONE SET of  
PORTABLE PAKFOLDS  
DARKEN?



PROTECTED BY PATENT

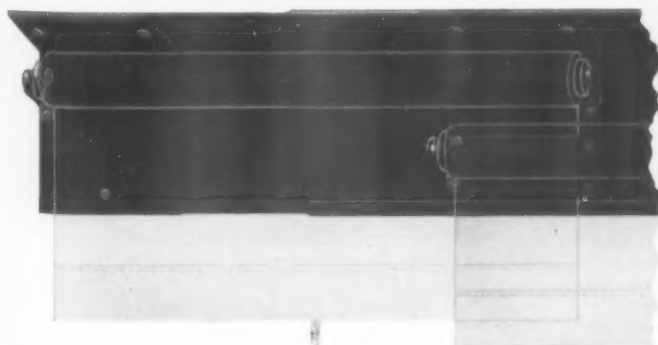
## PORTABLE PAKFOLD

The Draper Portable Pakfold can take it — easy to transport from room to room where needed. To apply this darkening shade or remove it, simply lift its supporting pulley from the pulley bracket, by use of the Draper Pulley Fork. No screws to remove — no ladder to climb.

When the Pakfold hangs over a double roller shade, as illustrated, both shades hanging on the face of casings or wall — a pair of Pakfold Spring Clips will hold the cloth close fitting around the double roller assembly, eliminating interference of the two shades and giving excellent darkening.

When not in use, the Pakfold is rolled up in a neat roll, with cover fastened by turn-buttons to keep it clean and in good condition, as illustrated.

Pakfolds are practical in all sizes. For large windows of unusual width or length Pakfolds are made with two sets of pulleys and cords.



## DRAPER X-L SHADING UNIT ELIMINATES SHADES TOO LARGE TO HANDLE

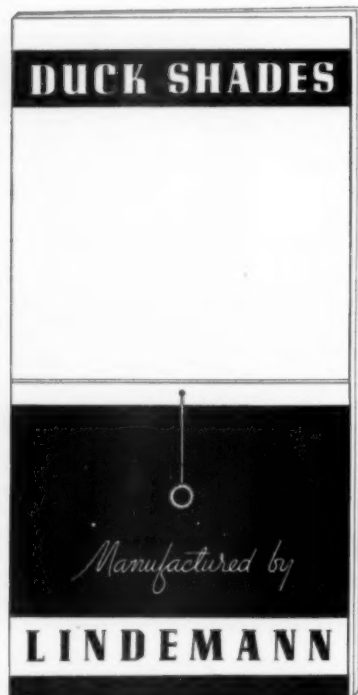
What other method so efficiently darkens multiple sash units or wide glass block areas? The X-L can be installed on the plaster wall to overlap the entire window opening or in a recessed pocket in the ceiling (by prior arrangement with your architect) in case the glass area extends to the ceiling line. Absolutely no limit in width. Write for further information concerning this unit which is engineered to give the efficient installation that you desire.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# CARL LINDEMANN COMPANY

School and Residential Shades, Venetian Blinds  
Jersey City, New Jersey

**LOWER COST THROUGH LONGER WEAR!**



For economical planning and extreme durability, Lindemann offers two types of duck shades; Canvashade and Launderwell.

Made of the best enameling ducks, these shades by virtue of their great strength and indestructibility, are rapidly replacing lighter weight fabrics which are not designed for the extreme service required of shades in public buildings.

**Canvashade**—made of pre-shrunk enameling duck, each individual fibre sealed with plastic finish, insuring perfect flexibility, smooth surface and increased cleaning qualities; material is water-proof; will not crack or fray.

**Launderwell**—pre-shrunk duck shade, vat dyed.

**Colors:** Canvashade — Linen or Black; Duplex Linen — Black; Launderwell — Linen.

Write for samples and further information. Our sixty years of specialization in quality window shade fabrics is at your service.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

Linen colored shades provide tempered translucency of proper intensity while Black shades find extensive use for Visual Education requirements.

**May be had in three styles:**

Style #1—Standard method, one shade to opening.

Style #2—Overlapping method, installed at meeting rail, upper shade controlled by stop pulley and single notch roller.

Style #3—Installed at meeting rail with permanent or adjustable metal light shield.



Caroline G. Atkinson School, Freeport, L. I., N. Y.  
Walter C. Hawkins, Supt. of Buildings Frederick P. Wiedersum, Arch.

## BOARD OF EDUCATION FREEPORT, LONG ISLAND NEW YORK

April 19, 1950

Carl Lindemann Co.  
46-54 Tuers Avenue  
Jersey City 6, N. J.

Att: Mr. A.F. Sittig  
Re: Caroline G. Atkinson School

Dear Mr. Sittig:

You are entirely correct in stating that "Canvashades" have been in use in our schools for a period of 17 years, and very recently were selected for the new Caroline G. Atkinson Elementary School Building.

Yours very truly,

Board of Education  
Freeport, New York

*Walter C. Hawkins*

WCH:AW

By- Walter C. Hawkins  
Superintendent of Buildings

**Carl Lindemann Co., 46 Tuers Ave..  
Jersey City, N. J.**

# COLUMBUS COATED FABRICS CORPORATION

DEPARTMENT U  
Columbus, Ohio

THIS IS AN ACTUAL SAMPLE OF

## **Bontex** DARKENING SHADES

In schools where darkened rooms for visual education are important, the showing of slides and films is aided by the use of Bontex Darkening Shades, Ivory or White.

Bontex is made from high-thread-count muslin impregnated with durable pyroxylin. It is scrubbable with soap and water, is colorfast to sun's rays; resists rain, snow and wind; withstands rough handling.

.....

Clip off swatch at dotted line, hold it up to light — see how completely it shuts out light rays. Scrub it, twist it, crush it, TREAT IT ROUGH. Hold to light again. No fading, pinholing, or fraying. All Bontex will stand this severe test.

### Wide Range of Colors, Patterns

Bontex comes in many colors, patterns and designs for a wide range of utility and decorative needs. And whether it's for schools, homes or any other type of building, dependable Bontex quality means a real saving.



### Bontex is Pyroxylin-Impregnated, Waterproof, Colorfast — Will Not Pinhole, Crack or Fray

For nearly 20 years, Bontex Shade Cloth has proved its quality and economy in the nation's schools—has demonstrated its excellence in controlling daylight and preventing glare, at lowest shade cloth cost per year. Lowest cost because Bontex has the quality and durability to take the punishment of bright sun, open window exposure to rain, snow and wind, and careless handling in schoolrooms.



*Cleans Like New*



*Resists Weather Damage*

### Can Be Scrubbed More Than 20 Times

That's because this high-thread-count shade cloth is pyroxylin impregnated and impervious to water, grit and grime. It even stands boiling, crushing and twisting. See for yourself by testing the attached sample. Then you'll readily agree that rugged, durable Bontex is genuine through-and-through quality.

### Clean, Clear, Uniform Colors

All Bontex colors are clear and uniform to screen the sun properly for minimum eyestrain wherever Bontex is used. Bontex is made in three distinct types; translucent, to let in most possible light; semi-opaque, to provide softer, more diffused light; and opaque which is absolutely black and excludes all daylight.



*Bexley High School, Bexley, Ohio, One of Many Bontex Installations*

**New, Free Sample Book**—Shows the complete Bontex line of plain and duplex colors, corded designs and printed patterns. Includes darkening shades (see sample swatch above) and permanently flame resistant shades which meet the

rigid specifications of the Boston Fire Dept. and A.S.T.M. Designation D626-41T. Write for this new Bontex Sample Book, free to school officials and architects. See the new patterns. Test Bontex for quality and serviceability.



# CUTCRETE CORPORATION

Manufacturers of Self-Trailer Concrete Saws

Pasadena 8, California

DISTRIBUTORS IN PRINCIPAL CITIES



**CUTCRETE**  
Self-Trailer  
**CONCRETE**  
**SAWS FOR**  
**THE SCHOOL**  
**BUILDING**

*Featuring* NEW TRAIL BLADE DESIGN



Cutting Walls for Installation of Doors, etc.

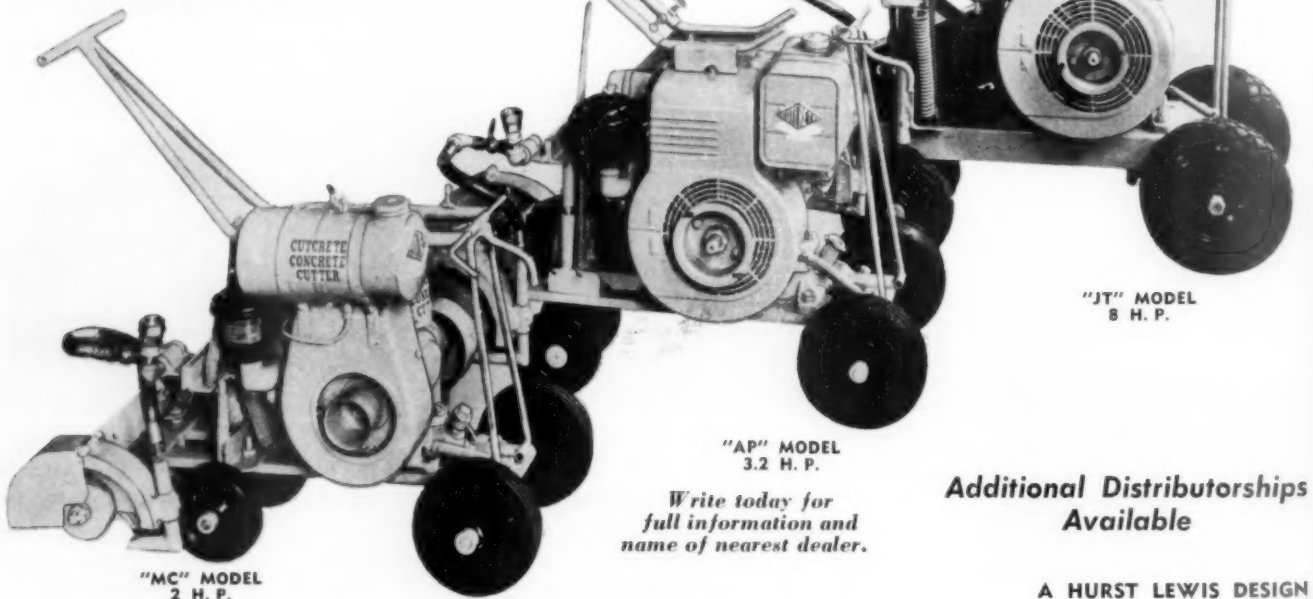


Use Cutcrete Saw for Cutting Trench for Pipe and Heating Lines

CUTCRETE CONCRETE SAWS will save your school Time and Money in Playground Maintenance and replacement of worn or cracked pavement. For conduit and pipe trenching. For remodeling existing school buildings for jobs such as sawing for installation of doors, windows and ventilating shafts. For grooving of ramps, pavement treading, swimming pools, laundry drainage grooving, channelling for pipes, conduits, alarm and signal systems and wherever a slip-proof safety Tread is needed on concrete or asphaltic surfaces.

## CUTCRETE SAWS FOR ANY CONCRETE CUTTING

- CUTTING TRENCH
- CUTTING PATCHES
- CUTTING WALLS
- TRIMMING PATCHES
- CUTTING PERMANENT MARKINGS ON SCHOOL TENNIS COURTS
- CUTTING SAFETY GROOVES IN SCHOOL SWIMMING POOLS



"MC" MODEL  
2 H. P.

"AP" MODEL  
3.2 H. P.

"JT" MODEL  
8 H. P.

Write today for  
full information and  
name of nearest dealer.

**Additional Distributorships  
Available**

A HURST LEWIS DESIGN

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# STEEL PARTITIONS, INC.

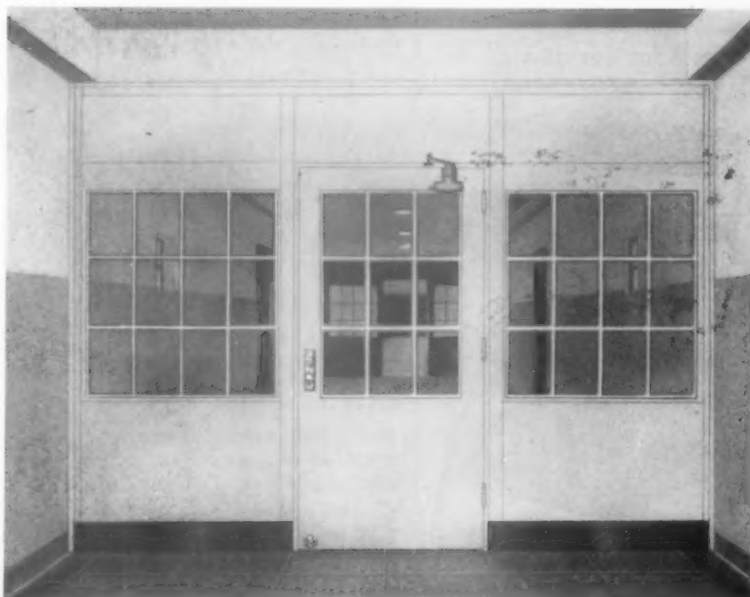
Jamestown, N. Y.

## Modernize For Greater Safety with **SMOKE SCREENS** *by Steel Partitions*

**that**

- LOCALIZE SMOKE HAZARDS
- PREVENT PANICS
- FACILITATE EVACUATION
- SAVE STUDENT LIVES

Below — Typical Type "E" SMOKE SCREEN with fixed transiom in hand grained walnut



Above — Typical Corridor installation featuring 3" Flush Type JF SMOKE SCREEN



Smoke filled corridors can be as great a menace to the safety of your students as fire itself. Corridor and stair well SMOKE SCREENS by STEEL PARTITIONS, INC. guard

against this hazard and are especially adapted, by design and construction, to installations in your present buildings. This added and vital safety factor warrants the serious consideration of every school official and should be a **must** in every modernization program. Our competent and experienced engineering staff is ready to assist you without obligation. Don't gamble with student safety, write or wire today!



## IRWIN SEATING COMPANY

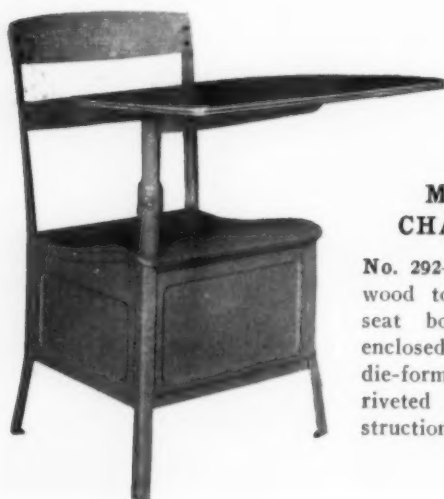
Grand Rapids, Michigan

The 4 most important considerations in the selection of school furniture are **Comfort—Style—Durability and Price.**

A point-by-point comparison will show you quickly that the newly designed Irwin Modern School Furniture is tops in the field on each of these important counts.

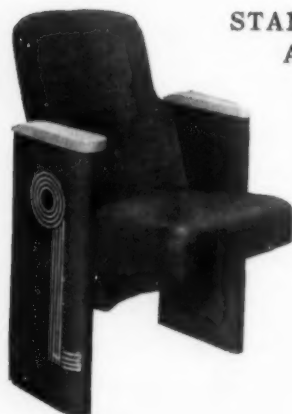
Scientifically designed for correct posture and attractive appearance, these modern, streamlined chairs and tables are constructed of the toughest lightweight metals and multiply hardwoods for lifetime service.

**Dollar-for dollar, they are the finest values available—write for our illustrated catalog today!**



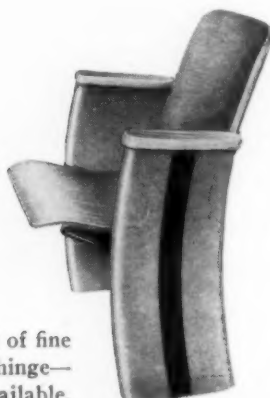
### MOVABLE CHAIR DESK

**No. 292**—Seven-ply hardwood top—large under-seat book compartment enclosed on three sides—die-formed glider feet—riveted and welded construction throughout.



### STANDARD AUDITORIUM CHAIRS

**No. 2241-1**—Designed to harmonize with any architectural design. Also furnished with full upholstered back or plywood seat.



**No. 2142-4**—New Streamlined unit of fine quality with silent ball bearing hinge—upholstered seat and back also available.



### MOVABLE DESK

**No. 254** is the only movable desk adjustable **3 WAYS** to fit all students. Adjustable for height of bookbox, for height of chair, and for distance between bookbox and chair. Equipped with a unique "Self-Leveling" device which eliminates rocking or jiggling occasioned by unevenness of floors, swivel seat with adjustable tension and many other highly desirable features.



### TWO COMPARTMENT TABLE

**No. 202**—An excellent table for two pupil classroom use—available without compartments in 4 sizes for kindergarten, libraries and cafeterias.

### STEEL FRAME CHAIRS

**No. 298**—An all-purpose chair of exceptional strength and durability. Will outlast a number of ordinary wood chairs.



**Write for our complete illustrated catalog**



# **FURNITURE AND EQUIPMENT**

**(Administrative—Instructional—Operating)**

**Audio-Visual Aids**

**Musical Instruments**

**Classroom Furniture**

**Folding Tables and Chairs**

**Office Equipment**

**Library**

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**Cafeteria and Kitchen**

**Residence Hall**

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**Shop**

**Locks and Lockers**

**Gymnasium Equipment**

**Swimming Pool**

**Bleachers and Grandstands**

**Floodlighting**

**Playground**





# RADIO CORPORATION OF AMERICA

EDUCATIONAL SERVICES

Camden, N. J.

## RCA VICTOR

### 45 rpm. RECORD and RECORD-PLAYER

Here are RCA Victor's new record and record-player . . . the first to be designed to work together. The record and record-player operate at 45 revolutions per minute and—for the first time—provide distortion-free music over the entire playing surface of the record. Unprecedented brilliance and clarity of tone.

The small-size record is capable of handling, in a single disc size, all the musical classifications from popular to classical. It can play more than 5 minutes.

The record-player has the world's finest record changer. It holds up to ten records and all changes are made from the center spindle. Operation is virtually noise-free.

The complete line of RCA Victor record players also includes equipment for playing 33½ rpm records and combinations which will play all three record speeds.



## RCA VICTOR

RCA Victor TI64



This is one of several RCA Victor television receivers ideally suited for the classroom. It gives you bright, clear pictures on a big 16-inch screen, *locked in tune* with the sending station by RCA Victor's Eye Witness Picture Synchronizer. Automatic Multi-Channel Station Selector makes program selection effortless.

Life Size Television with screen image up to 7 x 9 feet is available for school auditoriums. Sound is furnished by a loudspeaker housed in an acoustically matched cabinet for mounting near the screen.

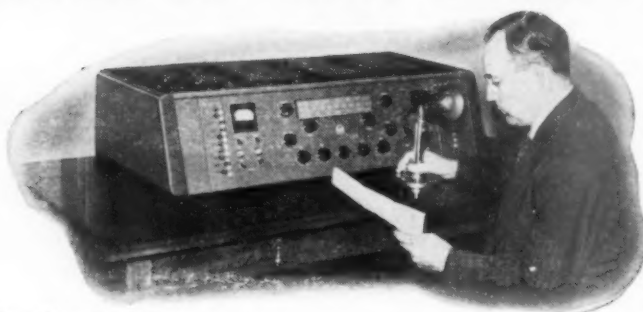
**RCA is a source for everything in television for schools, colleges and universities — from studio and broadcast equipment to classroom receivers**



# There Is An RCA Sound System That Meets The Needs Of Your School

## Standard Single Channel System

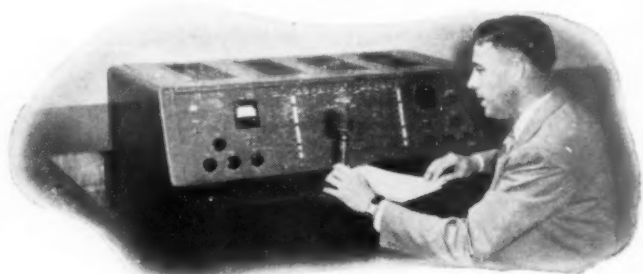
Here's a handsome low-cost Single Channel Program Console that distributes selected programs or administrative announcements to any or all locations equipped with loudspeakers in the school or grounds. Superb value, an exceptional buy for the medium-size elementary or junior high school working on a limited budget.



- 20 room or zone distribution switches with provision for installation of up to 20 more.
- 5 input circuits permit program pickup from any location.
- Built-in de luxe RCA radio with AM, FM and short-wave reception.
- Volume indicator meter.
- Provision for attaching separate record player or transcription turntable.
- Talk-back or two-way communication feature (optional equipment).
- Master emergency switch.

## Standard Dual Channel System

Administrators, supervisors, teachers and the student body use this Dual Channel Program Console for a variety of instructive purposes and for administrative control. Provides for the distribution of teaching programs or announcements to selected classrooms over one channel while the second channel simultaneously permits intercommunication or distribution of an additional program to other classrooms or areas in the school or grounds. Priced within the budget of high, junior high or the larger elementary schools.



- 9 input circuits provide numerous possibilities for program pickups from radio, phonograph and microphones in auditorium and elsewhere.
- Volume indicator meter.
- Switches control loudspeakers for 20 to 60 classrooms or areas.
- Provision for attaching separate record player, transcription turntable and radio tuner.
- 2 high-quality 25-watt amplifiers.
- Two-way communication between classrooms and console.
- Master emergency switch.

## De Luxe Dual Channel Equipment

Provides complete audio facilities for the larger high schools and colleges. Dual channel services for administrative broadcasts . . . teaching programs . . . radio listening . . . in-school program originations . . . record and transcription reproduction . . . independent two-way intercommunication (optional), unit-built from standardized frames and panels to allow numerous combinations of basic units. Gives you the advantage of a "custom-made" sound system within the price range of regular production equipment.



- De luxe studio-type control console.
- Individual loudspeaker selection for up to 120 rooms or areas.
- Provision for at least 10 program input circuits if desired.
- AM, FM and short-wave tuner (optional).
- Transcription or record player (optional).
- Master emergency switch.
- Provision for expansion or other features as required.
- Intercommunication (optional).

Whatever your requirements might be for a sound system for your school, RCA will be glad to help you select the correct system. Write to: RCA Educational Services, Dept. 2.

# The *RCA-400* Junior

**the only single-case, standard 16mm  
motion-picture projector of fully  
professional quality**

Pictures are projected at their best in brilliance ...sharp in detail and contrast. Voices, music and sound effects are heard with dramatic realism.

Sound or silent speed at the turn of a knob. Simplified threading. "Cushion Action" sprocket shoes. Powerful 10-watt, 4-stage amplifier. 2,000-foot film capacity. 2-inch, *f*/1.6, coated projection lens. These and many other features combine to make the RCA "400" Junior the ideal 16mm sound projector for your school.



## RCA VICTOR 2-SPEED TRANSCRIPTION PLAYER

**for phonograph records and 16-inch transcriptions**



**Model 2S7ED**

A high quality portable player for classroom reproduction of either standard phonograph records or 16-inch transcriptions. It is an ideal school instrument for music appreciation, social studies, and many other applications. Headphone jack for library use.

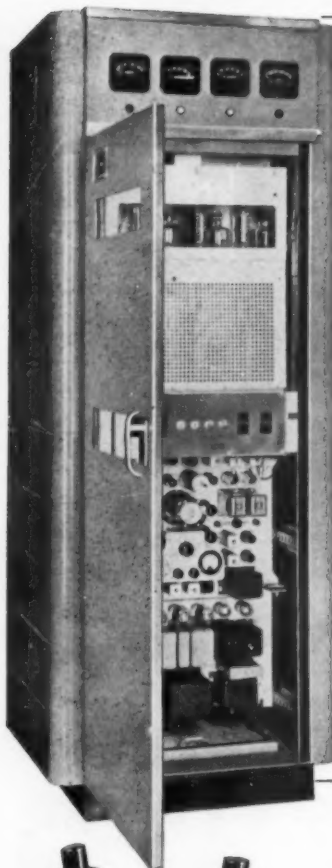
Two separate motors supply positive, constant speed to the turntable—one for 33½ rpm and one for 78 rpm. A two-position switch, for music or for voice, plus a wide-range tone control, ensures maximum performance at high or low volume. Detachable loudspeaker provides brilliant reproduction of all voices and musical instruments. Weight under 30 lbs. Sturdily built and attractively styled luggage-type carrying case.

## RCA INTERCOM SYSTEM



Provides instant voice-to-voice contact for exchange of information or paging between the school administration office and key individuals in the school system. Cuts down office traffic. Speeds up inter-office or departmental routine.

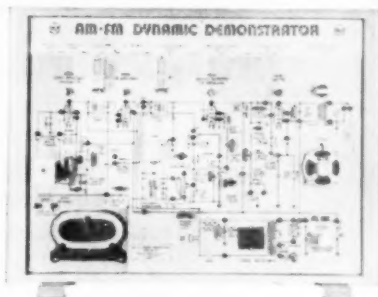
The master and remote station units may be installed in any combination to produce an intercom system tailored to the school's needs.



## RCA TEST and LABORATORY EQUIPMENT

RCA provides a wide variety of electronic test and instructional equipment for radio and electronic testing, measuring, and instruction.

RCA also manufactures the famous RCA Electron Microscope for high school and college laboratory research and instruction.



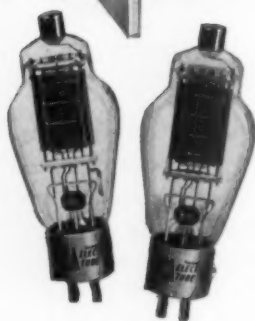
## RCA FM BROADCASTING EQUIPMENT

FM provides educators with a new method for extending education within the school system, for adult education, public relations and home listening.

RCA's popular "Direct FM" 250-watt transmitter, type BTF-250A (illustrated), has everything schools

and colleges need for outstanding performance, operating convenience and economy.

RCA's complete line of broadcast equipment includes everything for AM, FM and Television—from studio equipment to antenna and classroom receivers.



## RCA ELECTRON TUBES

Every tube type you need for reception or transmission of radio or television. Special purpose types for many applications.

## The Architects Manual of Engineered Sound Systems

An authoritative work book and reference manual on sound systems. Typical plans and specifications for sound systems for all types of buildings. Ideal text book for schools of architecture and engineering. Valuable for school library. Aids administrators in selecting correct sound systems.



WRITE: EDUCATIONAL SERVICES, RCA VICTOR, CAMDEN, N. J.



**RADIO CORPORATION of AMERICA**

EDUCATIONAL SERVICES,

CAMDEN, N.J.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

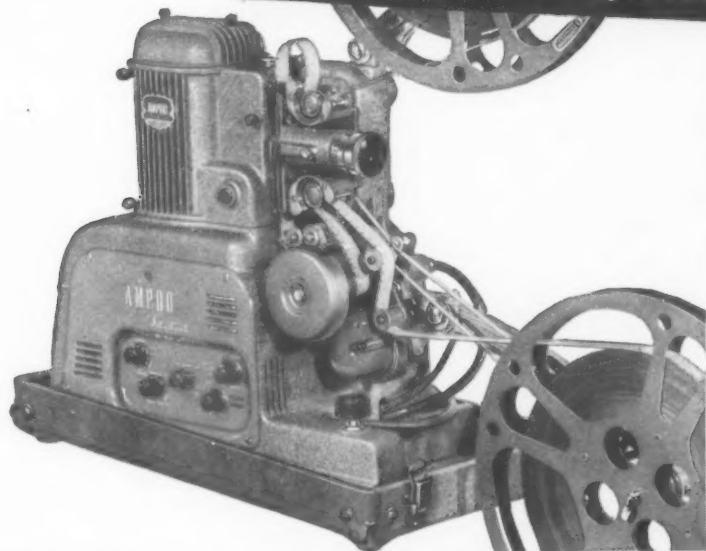


# AMPRO CORPORATION

2877 N. Western Avenue, Chicago 18, Ill.

## Today's Greatest Projector Values!

### AMPRO EXTRA QUALITY PROJECTORS



#### New Ampro Stylist

#### A Truly Lightweight Low Cost 16mm. Sound-Silent Projector

Amazingly compact and portable, the "Stylist" can be readily moved from room to room. Quick and easy to set-up . . . just lift off case, snap permanently attached reel arms in place and this new projector is ready to thread. Ampro quality features include: centralized control panel; rheostat control for efficient operation at both sound and silent speeds; automatic re-wind; coated super 2-inch F1.6 lens; AC-DC operation; 1000 watt lamp . . . and many other Ampro "extras" that mean smooth, trouble-free performance year after year.

Only \$325 Complete, including jack for microphone and phonograph

#### Record your own Sound for Movies and Slides!



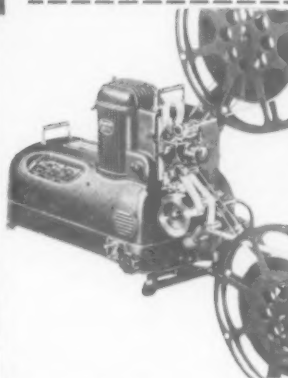
#### NEW LOW COST AMPRO TAPE RECORDER

You can put 2 full hours of recorded material on one 7" reel of tape! Lowest first cost, lowest operating cost! Completely portable one case unit, weighs only 15 lbs. So simple a child can operate it. Ideal for use in home, school, church or industry.

ONLY  
**\$94.50**

COMPLETE

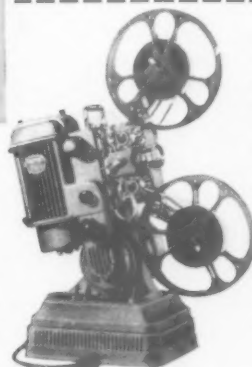
including microphone, take-up reel, radio-phone plug, speaker and amplifier.



#### AMPRO "PREMIER 20" 16mm. Sound-Silent Projector

An ideal premium quality projector for classrooms and auditoriums. Equipped for both sound and silent speeds, reverse and still pictures. Compact and portable, easy to set-up. Features include: 750-1000 watt lamp; swing-out gate for easy cleaning; automatic re-wind; triple claw film movement; simplified threading; centralized control panel; and many other features that make for smoother, more effective sound or silent projection.

Only \$493.50 complete



#### AMPRO "IMPERIAL" 16mm. Silent Projector

Offers brilliant illumination for large or small audiences, smooth, quiet, dependable operation for home, school or industrial use. Ampro features include: 750-1000 watt lamp; new swing-out gate for easy cleaning; still and reverse picture switch; triple claw film movement; easy threading film path and many more quality-features that make for easier operation, better projection.

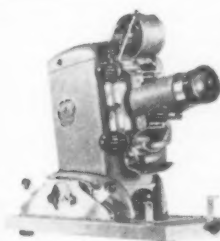
New Low Price \$199.50. Case extra. (Formerly \$276.00)

\* Trade Mark Reg. U. S. Pat. Off.

# AMPRO

8mm. Silent • 16mm. Silent  
16mm. Sound-on-film • Slide Projectors  
16mm. Arc Projectors

A General Precision Equipment Corporation Subsidiary



#### AMPRO "30-D" Dual Purpose Slide Projector

Designed for 2" x 2" slides and strip film. Unique Ampro optical system uses the entire cone of light. Offers instant conversion; self-centering slide carrier; curved film guide ways, many other features.

New Low Price  
**\$78.00**

WRITE FOR INFORMATION and full details on any or all of these precision-built Ampro products today. Ask also for the interesting, informative booklet, "The Amazing Story of 16mm. Sound Motion Pictures."

## AMPRO CORPORATION

2877 N. Western Avenue, Chicago 18, Ill.

# BAUSCH & LOMB OPTICAL COMPANY

655 St. Paul Street, Rochester 2, N. Y.

New York

London, England

Chicago

Toronto

Boston  
Canada  
Sao Paulo, Brazil

Los Angeles

Rio de Janeiro, Brazil

San Francisco



## B BALOPTICON \*—For Slides Only

This extremely popular model is inexpensive, sturdy in construction, compact, easily portable and highly efficient. Its optical system is of exceptionally high quality. It can be fitted with optical systems adapting it to a wide range of projection distances. Maximum illumination. Extremely simple to operate. Strip film, micro-projector and overhead projector attachments are available.

Model BDT is the same instrument as the B, but with a sturdy, tilting base, adjustable in two meridians. It permits leveling the Balopticon even when placed on an uneven surface. This mounting allows for changing the projection angle for screen at various heights.



\* Reg. U. S. Pat. Off.

## BGL 2" X 2" SLIDE PROJECTOR

Manufactured to the high standards of performance that characterize all Bausch & Lomb projection equipment, the performance of the BGL 2" x 2" Slide Projector is characterized by brilliant, crisp, sharply defined screen images plus comfort, safety and convenience in operation. Shows black and white or color transparen-

cies. An ideal instrument for projecting slides made by the instructor or by the students themselves.

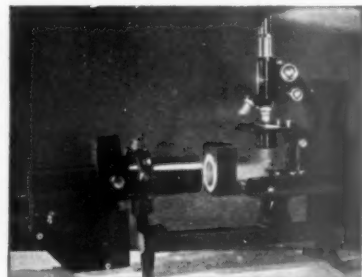
This instrument is substantially made and is fitted with a high efficiency Bausch & Lomb optical system. This consists of a 150 watt, single contact base bulb with a silvered, concave reflector, a triple lens condenser, one lens of which is heat absorbing, and a five-inch f/3.8 BGL Projection lens. Slide carrier permits use of cardboard, metal or glass mounted slides.

## MODEL B MICRO-PROJECTOR

The Model B Micro-Projector fills teaching needs in many fields. Any department where a compound microscope is used, by the addition of this instrument, can enjoy the advantage of efficient and economical micro-projection.

Simply place the microscope on the stage of the projector in an upright position, apply the prism reflector cap to the microscope and focus the illuminator. Complete directions accompany each projector.

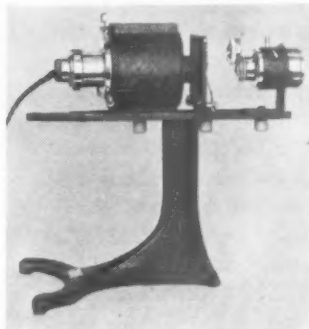
Investigate this instrument before completing your plans for science laboratory development.





### LRM AND ERM BALOPTICONS \*

The LRM Balopticon for lantern slides and opaque objects gives brilliantly sharp screen images under actual classroom conditions. An improved Built-In Blower-Cooling System efficiently safeguards objects being projected. The improved object holder is entirely free from interfering obstructions and permits projection of  $6'' \times 6\frac{3}{8}''$  areas of large maps, drawings or photographs. The door is arranged for convenience in placing solid objects in the projection area. The ERM Balopticon is similar, but equipped only for opaque projection.



### TRIPLE-PURPOSE MICRO-PROJECTOR

Especially designed and priced for high schools, this extremely efficient unit serves three definite purposes: (1) projection of permanently mounted

specimens on a screen from 4 to 15 feet away. (2) making drawings of microscopic fields. (3) projection of living specimens in liquids. Exceptionally sturdy in construction. Has both coarse and fine focusing adjustment. A two-power projection lens is included.

### BALOPTICON TABLE

The B&L Balopticon Table provides a means of placing a Balopticon where it can be used to best advantage. It is portable (rollers on two front legs), and has a shelf underneath for slide boxes.

\* Reg. U. S. Pat. Off.



### SEND FOR CATALOGS

*Catalog E-11 "Balopticons and Accessories," completely describes our line of Balopticons, many of which were omitted here due to lack of space. Micro-Projectors for school and college use are the subject of Catalog E-20. For information on Bausch & Lomb Microscopes and Spectrographs see pages 746, 747 of this book.*



# BELL & HOWELL COMPANY

7150 McCORMICK ROAD, CHICAGO 45

NEW YORK

HOLLYWOOD

LONDON

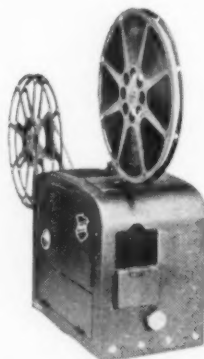
In the long run . . .  
*it's always*  
**Bell & Howell!**

For simplicity, dependability . . . for long years of hard use it's B&H *precision* motion picture equipment.

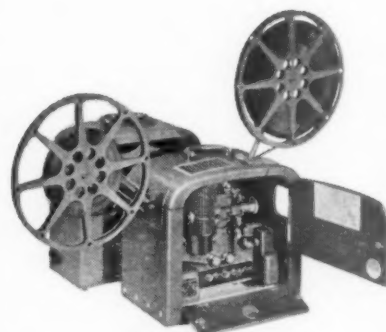
Yes, Bell & Howell products are designed to meet every school or church requirement. That means they must be easy to handle and operate . . . give top performance for a lifetime.

You can count on it . . . they will!\*

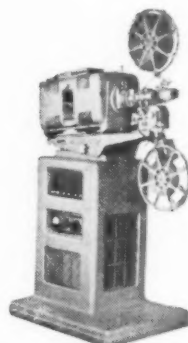
\***Guaranteed for life.** During life of product, any defects in workmanship or material will be remedied free (except transportation).



**Single-Case Filmosound.** 16mm projector shows sound or silent films, still picture and reverse. Light, compact . . . everything in one case for convenient carrying and storage. Built-in 6-inch speaker operates within the case or removed from it. Larger, separate speakers available for single or multiple use as desired.



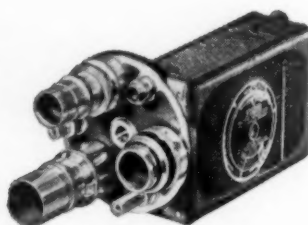
**New Academy Filmosound.** Has same outstanding features as the Single-Case Filmosound, but is designed for larger audiences. 8-inch, 12-inch or large power speaker available as desired.



**Filmoarc 16mm Sound Projector.** High-intensity arc illumination for sound film projection in largest auditoriums and outdoors. Compact, portable and easy to operate.



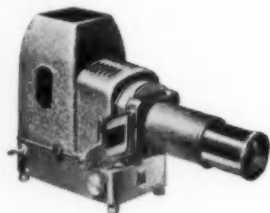
**70-DA Camera.** 16mm turret-type with variable viewfinder matching lens in use. Seven speeds . . . tops in versatility.



**Auto Master 16mm Camera.** Magazine loading. Three-lens turret head automatically matches viewfinder to lens in use. Five speeds.



**Auto Load 16mm Camera.** Five speeds. Quick magazine loading. Fast  $f/2.5$  lens. Most compact of all 16mm cameras.



**Duo-Master Slide Projector.** Brightest of all 300-watt slide projectors. Easy loading, high definition, steady projection.



**Foton 35mm Still Camera.** Ready for action after every shot. No knobs to turn. Sequence of shots, too—up to 6 per second. Unequalled T 2.2 ( $f/2$ ) Cooke-Amotal lens calibrated in T-stops.

## Sharper pictures than ever before!

The new *Super Proval* lens with built-in field corrector keeps picture edges clean and clear . . . gives far greater sharpness than ever before. Featured on all new Bell & Howell 16mm projectors, except the Filmoarc. Also fits many older B&H projectors. Write for information.

# CHARLES BESELER COMPANY

Est. 1869

60 Badger Avenue, Newark 8, N. J.



## A Truly NEW Opaque Projector!

# BESELER VU-LYTE

This amazing Presentation Tool heralds a new era of Projection Efficiency . . . Economy . . . Convenience

The new VU-LYTE is definitely *not* a remodeling of an old model. It is entirely new in conception—the result of new thinking. VU-LYTE is without question the finest opaque projector ever made.

### Plus These Other Important Features of the Beseler VU-LYTE

- Much more illumination.
- Easy on the eyes—no sudden flashes.
- 40% lighter in weight.
- Exceptionally cool.
- More compact.
- No flutter of copy being projected.
- Comparative material may be projected simultaneously.
- Larger throat depth.
- Rack and pinion focusing mount designed to permit focusing at wide range of projection distance.
- Spring loaded elevating legs individually suspended to compensate for uneven surfaces.

VU-LYTE accommodates 8½" x 11" pages vertically or horizontally. Actual opening is 10" x 11". Anastigmat coated lens (in an anodized aluminum barrel) provides exceptionally clear, crisp images right to the corners of the screen. 1000 watt—T-20 lamp medium pre-focus base. AC only. 36 lbs., 13" wide, 22" long, 24" high.

\* Pat. Pend.

### 3 New Features—Exclusive with Beseler

#### 1. *Vacumatic Platen* \*

Suction holds all copy—from a postage stamp to a full 8½" x 11" page—either horizontally or vertically, absolutely flat on the platen. Eliminates need for bothersome mounting or picture holders. Completely eliminates flutter.

#### 2. *Feed-O-Matic Conveyor* \*

Continuous, smooth projection is achieved by means of this newly developed conveyor belt. Material is advanced into projection position by turning handle on Feed-O-Matic. New copy is fed in as old copy is ejected from other end, thus giving uninterrupted projection. Ideal for continuous copy in scroll form. Light flashes in room are eliminated because platen is not raised or lowered when copy is inserted into projector.

#### 3. *Pointex* \* *Projection Pointer*

The operator now can superimpose an arrow on any part of the illustration on the screen merely by turning a knob. Pointex permits the teacher or lecturer—without moving from the projector—to "point out" any detail of his projected material.

**Write today for FREE DEMONSTRATION**

**CHARLES BESELER COMPANY**

Est. 1869

60 Badger Avenue, Newark 8, N. J.

The World's Leading Manufacturer of Opaque Projectors

# THE BRUSH DEVELOPMENT CO.

3405 Perkins Avenue • Cleveland 14, Ohio

now the world's finest educational recorder . . .

the new, improved **SOUNDMIRROR** with the amazing

*"Magic Ribbon"*

## Only the SOUNDMIRROR offers all these advantages

• **Superior tone quality and fidelity**—Lifelike fidelity in voice recordings—rich depth of tone in music. There's no scratchy background or needle noise to mar the reproduction.

• **Easy to handle "Magic Ribbon"** recording tape. Cannot snarl or tangle. "Magic Ribbon" and the Soundmirror, by Brush, were made for each other. Soundmirror can be used with other tapes, also.

• **Program can be "edited"**—"Magic Ribbon" recording tape can be easily cut and rejoined with cellulose mending tape to remove unwanted portions and rearrange program sequence.

• **Simplified operation**—No other recorder is so easy to operate. No complicated threading. Simple control provides for play, record, rewind, or fast forward functions.

• **Automatic high speed rewind**—"Magic Ribbon" automatically reverses and rewinds in less than three minutes . . . faster than any competitive recorder on the market!

• **"ACOUSTICEL" non-directional microphone**. Provides fidelity and sensitivity usually offered only in professional types.

• **Easy fast indexing**—Provision is made for returning quickly and easily to a decided portion of a recording.

• **Thirty minute recording time**—Provided by each reel of "Magic Ribbon". . . ideal for school use.

• **Economy**—In addition to the reasonable first price, the economy of the "Magic Ribbon" recording tape is important to the school budget. "Magic Ribbon" can be replayed indefinitely . . . can be erased and reused again and again.

• **Adaptability**—The SOUNDMIRROR can be connected directly to a radio receiver for recording. It can be connected to the school sound system for replaying programs throughout the building.

## Uses for SOUNDMIRROR

★ **FOREIGN LANGUAGE**  
quick recognition of word sound and usage

★ **ORCHESTRA AND BAND**  
recording concerts and practice sessions for study

★ **POLITICAL AND HISTORY**  
dramatized commentaries and current events

★ **SCHOOL EXERCISES**  
special school events and educational addresses

\* T.M.R.

★ **SPEECH STUDY**  
correction of speech defects

★ **MUSIC APPRECIATION**  
building musical and vocal libraries for study

★ **DRAMA STUDY**  
classroom programs and elocution training

★ **DISCUSSION GROUPS**  
School society meetings and social and civic studies



Brush brings you the new  
**Educational Model**  
(BK-428-B)

The professional tape recorder amateurs find easy to use. Records up to one-half hour. (Other models record one continuous hour.) High tone fidelity. Has handles, making it easy for one or two people to carry from room to room. Beautiful cabinet, blond or mahogany.

Priced right for your school budget

# SOUNDMIRROR®

Magic Ribbon School Recorder

The Brush Development Co., 3405 Perkins Ave., Cleveland 14, Ohio

*Brush* . . . FOR MORE THAN 10 YEARS LEADERS IN MAGNETIC RECORDING

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



# PRESTO RECORDING CORPORATION

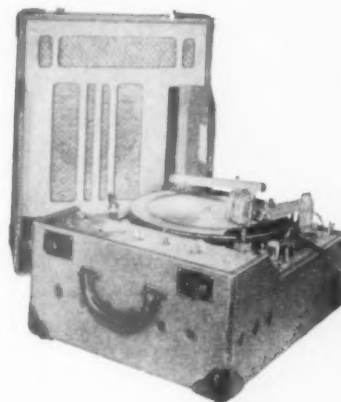
Paramus, New Jersey

you get what you pay for...

## THAT'S WHY IT PAYS TO GET A PRESTO

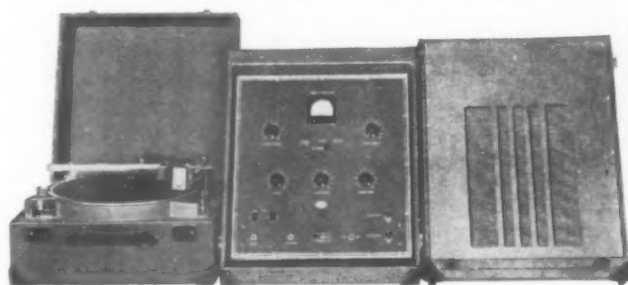
Considering the use and abuse recording equipment receives in the average school, or university, particular care should be taken in selecting an instrument that is quality-built to withstand the shocks of inexperienced operators. Also, this instrument should be capable of reproducing the full range of frequencies and flexible enough for every classroom use.

That's why so many hundreds of the nation's finest educational institutions have chosen PRESTO equipment. PRESTO recorders, built to the most exacting specifications and used throughout the broadcasting and recording industries, are constructed for consistently good performance with a minimum of maintenance... yet priced within the most modest school budget. For satisfying years of perfect service... PRESTO is truly *the best buy in recording.*



### PRESTO DISC RECORDER (MODEL K-10)

Teachers of speech, music and dramatics have found the Model K-10 the best buy in its class. Records and plays microgroove records, has a 12" dual speed turntable (33½ & 78 rpm) with 45 rpm available at additional cost, 7 tube amplifier, detachable dynamic speaker, magnetic cutting head, 50-8000 cycle frequency response, cuts records outside-in or inside-out. \$348.00 (\$5 additional for 45 rpm).



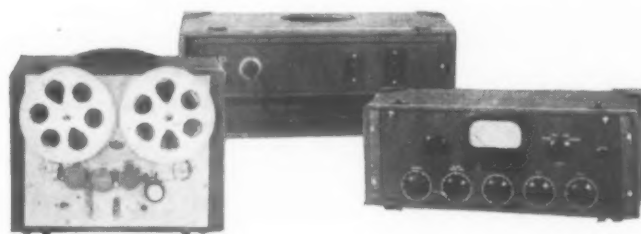
### PRESTO DISC RECORDER (MODEL Y-5)

A precision built recorder, completely portable. Cuts microgroove or standard discs any size up to 17¼" discs. Rim drive for minimum vibration, instant speed change from 33½ to 78 rpm, (45 rpm available at additional cost). May be used to cut master recordings from which commercial pressings are made. Frequency response: 30 to 10,000 cycles, ten-inch dynamic speaker is completely detachable. \$771.00 (\$10 additional for 45 rpm).



### PRESTO DISCS (GREEN, BROWN, ORANGE LABEL)

PRESTO discs are manufactured under dust-free, temperature-controlled conditions in a plant where human hands never touch their glass-like surface. Throughout the world, they have won engineers' acclaim for the best performance and having the most permanence. Educators using disc recording equipment specify PRESTO as the most reliable, best buy in the disc field.



### PRESTO TAPE RECORDER (MODEL PT-900)

Schools everywhere have found the presto portable tape recorder a perfect answer to their recording problems. Same tape may be used repeatedly by erasing previous recording on the same machine. This is the only tape machine in its price class with separate recording, playback and erasing heads and two separate amplifiers. Available in either 15"/sec & 7½"/sec or 7½"/sec & 3½"/sec speeds. Frequency response: 50 to 15,000 cycles at 15"/sec. Packs into two portable cases for easy transportation. \$695.00



Paramus, New Jersey

In Canada:  
Walter P. Downs, Ltd.  
Dominion Square Bldg.  
Montreal, Canada

Overseas:  
M. Simons & Son Co., Inc.  
25 Warren Street  
New York, N. Y.

**WORLD'S GREATEST MANUFACTURER OF  
INSTANTANEOUS SOUND RECORDING  
EQUIPMENT AND DISCS**

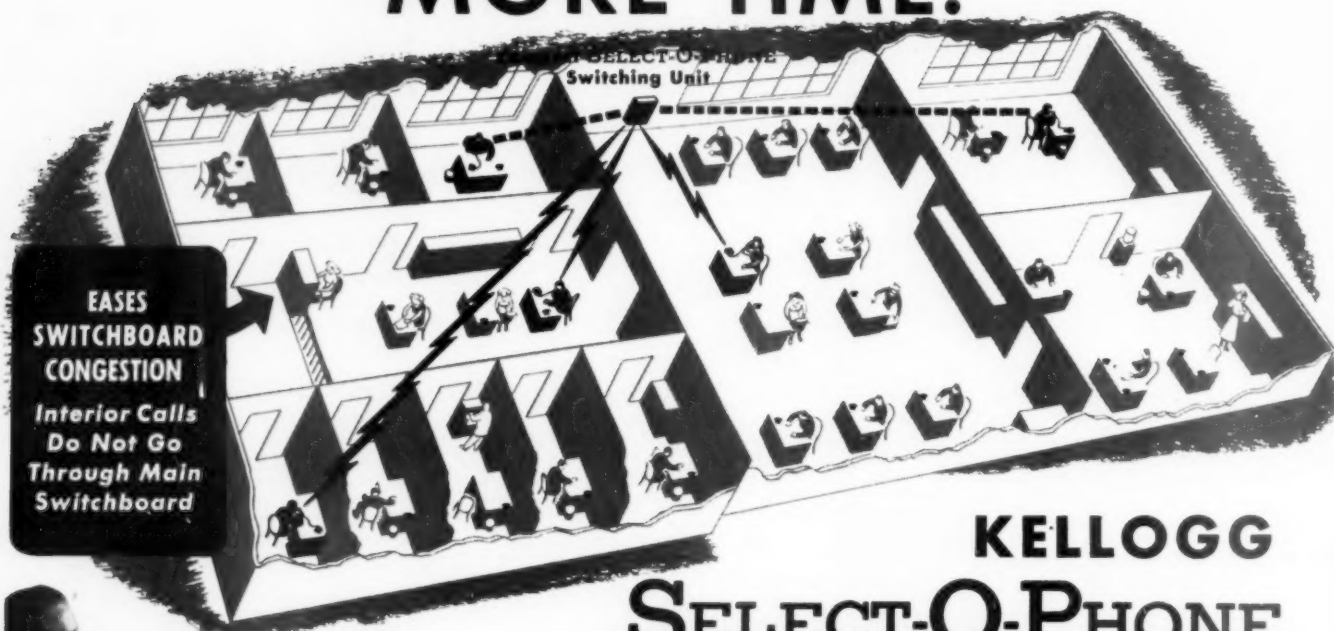
# SELECT-O-PHONE DIVISION KELLOGG SWITCHBOARD & SUPPLY COMPANY

6650 South Cicero Avenue

Chicago 38, Ill.

How to Give a Hard-Pressed Administrative Staff

# MORE TIME!



## KELLOGG SELECT-O-PHONE

### Automatic, Private Telephone and Paging System

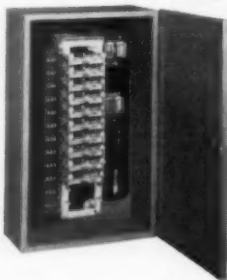


#### A Conference . . . with Everyone in His Office!

The entire staff—or any part of it—can “get together” in just a few seconds, through the automatic service of the SELECT-O-PHONE system. Any person can call any other person or up to 47 other persons. SELECT-O-PHONE is the only system that makes this practical.

#### Switching Unit Is Compact, Wall Mounted

Switching equipment requires no special room, operators or batteries — can be wall-mounted. No expensive wire plan or cabling is needed.



Transmission of information, exchange of ideas, gathering of facts — these are as quick and easy as the flicking of a dial with the Kellogg SELECT-O-PHONE System. When administrative staffs are “snowed-under,” SELECT-O-PHONE enables them to accomplish more, with less effort. No switchboard delays—no jamming of “outside” lines with “inside” calls.

SELECT-O-PHONE offers you a prime advantage over other systems. Every telephone is a “master station.” Any one person

can call any other person, or initiate a conference call with any group of people connected in the system. You have less lost motion!

Your SELECT-O-PHONE system will pay for itself in savings in as few as two, three or four years. You postpone indefinitely the enlargement of your present rented switchboard equipment. SELECT-O-PHONE also saves money by reducing outside telephone bills and gives better control over outside personal calls.

- ★ SELECT-O-PHONE is the only system which permits an unlimited number of simultaneous conversations.
- ★ Every conversation is confidential—and there are no loudspeaker answers for visitors in your office to overhear. (“name-touch” executive station with loudspeaker is optional.)
- ★ Code signal or paging on “General Call” will bring the man you want to the nearest telephone and instantly complete the connection without the assistance of an operator.
- ★ SELECT-O-PHONE System is built by Kellogg—maker of quality telephone communications equipment for 50 years — your guarantee of long, trouble-free service.

Contact Your Nearest Distributor  
or Write Direct

Find out how others are using the  
SELECT-O-PHONE dial telephone system to  
save time and reduce administrative costs.

# SQUIBB-TAYLOR, INC.

1213 South Akard Street, Dallas 1, Texas

## THE NEW *Taylor* SPOTLIGHT OPAQUE PROJECTOR

### ONLY THE TAYLOR "SPOTLIGHT" HAS THESE IMPROVED FEATURES

**SINGLE 1000-WATT LAMP**—gives from 10% to 20% more light on screen.

**BETTER COPY COOLING**—about 15 degrees cooler operation. This means less damage to copy and more comfort for operator.

**ENTIRE CASE ADEQUATELY COOLED**—Copy tray and operating parts are especially cool.

**APPROXIMATELY 30% REDUCTION IN WEIGHT**—easily portable.

**SMALLER**—More than 35% reduction in volume over nearest competitor.

**LOW NOISE LEVEL**—cooling fan is exceptionally quiet. Motor is modern design with sealed-in lifetime oil reservoir. No servicing required.

**QUICK CHANGE**—Lamp and front surface mirror instantly accessible for replacement.

**RACK AND PINION ELEVATING**—Turning a conveniently located knob raises or lowers projector quickly to required level.

**RACK AND PINION FOCUSING**—Turning a knob focuses picture quickly.

**EXHAUST COOLING**—instead of blower type. Air is exhausted from projector and directed in a single path away from operator and away from audience.

**AIR FLOW CONTROL**—for convenient placing of small single sheet copy.

**LESS GLARE**—Special construction reduces light spillage during operation of projector.

**MAXIMUM LENS EXTENSION**—permits "front of the room" operation. A distance of six feet from the screen with a 3'x3' image when space is at a premium.

*20% More Light*

*30% Less Weight*

*35% Smaller*



*The Outstanding Opaque Projector for SCHOOLS, CHURCHES, INDUSTRY!*

#### SPECIFICATIONS

##### DIMENSIONS AND WEIGHT

Length: 17". Height: 20". Width: 13 1/4".

Weight: 35 lbs.

##### LENS AND METHOD OF FOCUSING

Coated Lens: 4 1/2" diameter. Focal Length: 18"

Easily turned knurled knob to focus.

##### ELEVATING

Slight turning of knurled knob operates elevating mechanism.

##### ILLUMINATION

Single 1000-Watt Lamp (Radiant T-20). Manufacturer's estimated bulb life 50 hours.

##### CONSTRUCTION

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Will handle 11" x 11" copy in sliding drawer. Platen projected area is a full 10" x 10" after allowing for marginal hold downs.

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THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



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THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

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## BALDWIN GRANDS and Baldwin Built HAMILTON UPRIGHTS



A few of the 134 Style 242 Hamilton School Pianos purchased by the Department of Education of Baltimore, Maryland, ready for shipment from Cincinnati to Baltimore. 15 Style "R" (5' 8") Baldwin Grand Pianos were also part of this purchase.

With painstaking thoroughness, Department of Education officials, responsible for the purchase of new piano equipment for Baltimore's 167 school systems, investigated the merits of each piano on the market. Their choice of Baldwin products is a dramatic example of Baldwin quality and leadership in the piano industry.

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The Estey Folding Organ. Compact, Sturdy. Dark walnut or special finishes at slight extra cost. Two full sets of reeds. 8' Diapson; 4' Flute. Four octave keyboard. Swell shade and mute release provide vibrant crescendo and tone brilliance. Oversize bellows give smooth sustained chords, wide volume range. Length 30 1/2". Height (open) 30", (folded) 20". Depth (open) 16", (folded) 11 1/2".

# ESTEY ORGAN

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



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WHICH piano represents the wisest investment for the school? The answer, of the nation's leading music teachers and school administrators is "the Steinway." This glorious instrument, product of almost a century of experience, combines superb beauty of tone with qualities of endurance which a school piano must have.

The Steinway may cost more at the outset, but in terms of value received, it is actually the least expensive of pianos. Carefully selected woods, properly seasoned for many years, enhance the Steinway's ability to withstand the stress of constant use and temperature changes. No other piano matches the Steinway's capacity for holding tune. Because of its amazing durability only

the Steinway has as high a resale or turn-in value.

The Steinway is the choice of the principal radio and television stations and of over 1000 music schools and colleges. More than 2000 Steinway pianos were purchased by the U. S. Army during the war for use in extreme climates all over the world.

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**STEINWAY—The Standard Piano of the World**

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



*American Seating Company Presents the New*

**AMERICAN UNIVERSAL "TEN-TWENTY"**

*Key to the Coordinated Classroom*

...AND AMERICA'S MOST ADVANCED LINE OF CLASSROOM FURNITURE



## AMERICAN SEATING COMPANY

GRAND RAPIDS 2, MICHIGAN

*Manufacturers of School, Auditorium, Stadium, Theatre, Transportation and Church Seating, and Folding Chairs*

American Seating Company is the world's leader in public seating. For over 60 years this company has led the way for the industry, pioneering many improvements in school furniture which have since become standard. Continuous research and

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# THE NEW "Ten-Twenty" AMERICAN UNIVERSAL

This new desk marks the greatest progress yet achieved in school seating. It is the product of years of research among thousands of children, resulting in the development of the co-ordinated classroom—where seating, lighting, and decoration are co-ordinated for maximum benefit to the pupil's posture, eyesight, and ability to learn.

This is the first desk to provide a choice of 20° slope, 10° slope, or level position—the 20° slope for reading, writing, or drawing—the conventional 10° slope when lesser slope is wanted—and the level position for manipulative tasks such as clay modeling and block arrangement.

Exclusive automatic fore-and-aft adjustment functions automatically at will of pupil, stopping smoothly and

quietly at both ends of seat travel (2½") or at intermediate positions. Approaches perfect focal adjustment for all work on desk-top in each use position. Both seat and book-box are adjustable to required heights by means of one-piece, rounded, never-failing clamps on the Universal frame. Fluted foot-rest minimizes marring of finish.

Seat swivels 45° either way, to silent, cushioned stops, reducing body torque induced by the child's right or left hand and eye preferences. It also provides easy ingress and egress. Deep-curved back with self-adjusting lower rail to fit each occupant, and plywood cradleform posture seat with no rearward elevation, promote relaxed sitting with freedom to perform.

AMERICAN  
PROGRESSIVE  
TABLE No. 328

with the  
"Ten-Twenty"  
Top



(Shown with No. 368 Envoy Chair)

This new American Progressive Table features the famous "Ten-Twenty" 3-position top, as described above. Strong, hot-press urea-resin-bonded top, 20¼ x 24 inches, has rounded corners and edges, and is finely lacquered in natural-wood finish. Metal parts are dipped in beige, alkyd-urea enamel and baked. One-piece sanitary steel book-box has full-length pencil tray inside. Inkwell is an optional accessory. Heights, with top level: 21, 23, 25, 27, 29". (See facing page for American Envoy Chair No. 368).

AMERICAN  
UNIVERSAL  
DESK No. 434



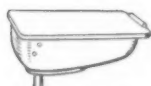
This widely-used desk has all basic features of the new "Ten-Twenty" except the 3-position top and the fore-and-aft seat adjustment. Its features include sanitary one-piece steel book-box, cradleform swivel seat with deep-curved back and self-adjusting lower rail, and easy height adjustment. Desk-top 17¾ x 23¾"; may be used level or at 10° slope. Strong, housed blade-hinges; quiet friction control. Inkwell is optional accessory. Three sizes, for all grades, and adults. Natural-wood finish; also school brown as extra, on special order.



Top at conventional 10° slope



Top raised for easy access to book-box



Top level for manipulative tasks

## DESK NO. 436

### KEY TO THE CO-ORDINATED CLASSROOM

Roomy, sanitary, one-piece steel book-box has round-rolled edges, smooth, rounded lines and contact surfaces, inside and out, with generous knee and leg room. Strong plywood top, 20¼ x 24". Tamper-proof housed mechanism. Full-length pencil tray inside. (Inkwell is optional as an accessory.) Wood parts beautifully and durably lacquered in L-31 natural-wood finish with 30% to 55% reflectance. Metal parts dipped in E-286 beige enamel and baked. Three sizes, for all grades, and adults.



**FREE BOOKLET!** Write for new illustrated booklet, "The Case for the 'Ten-Twenty'," giving complete details and reports from educators.

**ALSO CATALOG—**Complete 1950 catalog sent on request.



#### American Envoy Posture Chair No. 368

All-purpose chair, combining functional beauty with posture, comfort, durability, lightness, economy. Monosteel frames joined to cross-members by multiple welds for great strength. No rivets, no squeaks. Formed seats, deep-curved backs with self-adjusting lower rail to fit each occupant. Urea-resin-bonded plywood seats and backs, in natural-wood finish; or school brown as extra. Seat hts.: 11", 13", 15", 17".



#### American Envoy Tablet-Arm Chair No. 380

Unequaled value in a low-priced tablet-arm chair. Designed for comfort and good posture. 23½" x 12" tablet-arm slopes 3¼" within its length for comfortable writing. Roomy, sanitary book cabinet. Enclosure panel on occupant's right is optional accessory. Seat height, 17" only. Same steel construction and finish as No. 368 chair, plus rigid, formed-steel arm support, securely welded to frame. (Also available: No. 378 without book-compartment.)



#### American Envoy Desk No. 362

Strongest and most comfortable desk of its type. Convenient 10° slope of desk top assures comfortable reading and writing. Tubular desk support and clamp permit easy height adjustment of desk top. Roomy, sanitary book cabinet. Enclosure panel for book cabinet at right of occupant is optional. Same construction and finish as above, for years of trouble-free service. Seat heights: 13", 15", 17".



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For kindergarten on through college; also cafeterias, dormitories, offices, libraries. Tops heavy, cored-plywood construction—hot-press, urea-resin-bonded for strength and moisture resistance. Superior to solid-wood construction of equal thickness. Lacquered in natural-wood finish; or school brown as extra. Baked-on beige-enameled steel end standards; no knee interference. Book compartments extra.

TOP	HEIGHT				
24 x 48"	21"	23"	25"	27"	29"
30 x 60"	21"	23"	25"	27"	29"
30 x 72"	21"	23"	25"	27"	29"
36 x 72"	21"	23"	25"	27"	29"

Two-compartment unit supplied for 48" table, three compartments for 60" and 72" tables.

**American  
Universal Desk  
No. 435**



A correct-posture desk without book-box. Has abundant knee and leg room. For high-school classrooms, study halls, and rooms with individual lockers. Rigid, 10°-sloped study-top, 17 $\frac{3}{4}$ " x 23 $\frac{3}{4}$ " has rounded-edge metal apron. Cradleform posture seat swivels 45° either way, reducing body torque and providing easy ingress and egress. Adjustable in height. In seat size "X" only, 15 $\frac{1}{2}$ " x 17 $\frac{1}{2}$ ", with or without book-rack.

**Pedestal  
Tablet-Arm Chair  
No. 472**



Cradleform posture seat is 17 inches high, with solid, deep-curved back. 23 $\frac{1}{4}$ " x 12" tablet-arm is proper height and slope for writing comfort. Oval steel pedestal has 9" x 11 $\frac{1}{2}$ " base. University-size "X" seat is 15 $\frac{1}{2}$ " deep and 17 $\frac{1}{2}$ " wide. Book-rack optional. Metal parts have dipped, baked-enamel finish. (Chair No. 471 is identical except for open back with self-adjusting lower rail.)

**All-Purpose  
Folding Chair  
No. 54**



Ruggedly-built, popular-priced chair for cafeterias, libraries, assembly halls, gymnasiums, dormitories, offices, chapels, etc. Five-ply urea-resin-bonded formed plywood seat; steel frame and formed back panel. Easy to carry and store; quiet in use and folding. Also available: No. 53, all steel, suitable for outdoor use; and No. 56, seat upholstered in high-quality imitation leather.

**Bodiform  
Auditorium Chair  
No. 16-001**



Combines modern beauty with maximum comfort and the convenience of extra room for sitting and passing. Automatic safety-fold action—seats rise to  $\frac{3}{4}$  fold when vacated, making for easier housekeeping. No pinching or tearing hazards. Upholstery is easily replaceable. Other auditorium chairs available with plywood back and seat; also semi-upholstered types.

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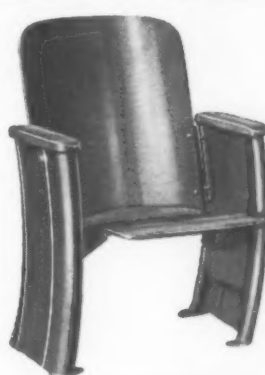
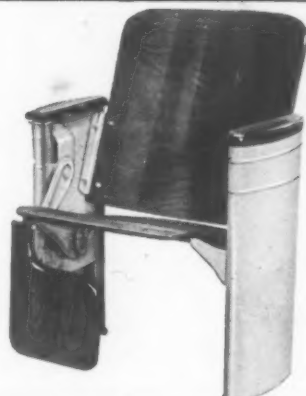
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Menominee, Michigan



Heywood-Wakefield Tubular Steel Furniture is available in a range of types and *graded sizes* to meet every classroom and auditorium need from Kindergarten through College. Write for our illustrated catalogue showing this modern furniture. Heywood-Wakefield School Furniture Division, Menominee, Michigan.

# NORCOR MANUFACTURING COMPANY

## GREEN BAY • WISCONSIN

206 Lexington Avenue  
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**TUBULAR DESK AND CHAIR, AUDITORIUM  
GANGED CHAIRS, DELUXE MOVABLE DESKS,  
TABLET ARM AND DETACHABLE ARM FOLDING  
CHAIRS, ALL PURPOSE CHAIRS.....**



### FOR ALL PUBLIC SEATING NEEDS

The NORCOR line of wood and steel portable public seating and school furniture is one of the most complete offered. In addition to the several items illustrated, it also includes auxiliary folding tables. Numerous exclusive Norcor structural features and manufacturing methods assure strong, sturdy rigidity and durable long life. School desks, tablet arm and all-purpose chairs are available in several junior and senior sizes — The new tubular steel school desks and chairs which are creating such a sensation are available in a complete range of sizes. All chair seats and backrests are scientifically correctly postured for the utmost in seating comfort. Steel frame colors are Brown, Taupe, Beige, and Olive Green — wood parts or units in Natural, Walnut, or new School Brown. Write for catalog describing our complete School and Auditorium Seating Line in detail.



*The* **NORCOR** *Line*

NORCOR MANUFACTURING CO., INC. • GREEN BAY • WISCONSIN



TOP: Tubular desk and chair unit. Ganged auditorium wood chair unit. ABOVE: Deluxe desk and tablet arm chair. BELOW: Detachable tablet arm, tubular folding chair. All-purpose tubular chair. Channel steel folding chair. Tubular steel folding chair.



THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# THE BREWER-TITCHENER CORPORATION

118 Port Watson St.  
Cortland, New York

*Hostess*

## FOLDING BANQUET TABLES and CHAIRS



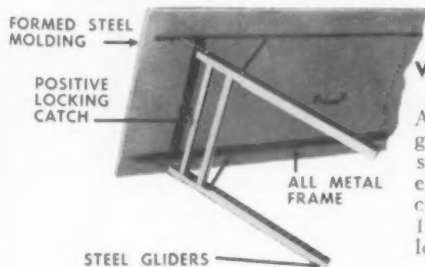
STACKS 6 TABLES IN 19½ INCHES



### FOLDING BANQUET TABLES

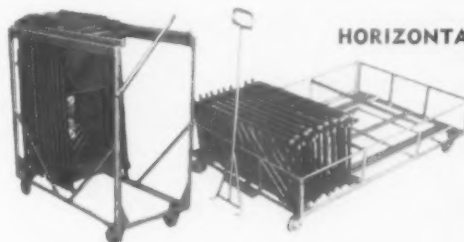
Handsome, sturdy HOSTESS Tables are the ideal choice wherever folding banquet tables are required. Two popular styles of tops available: REGULAR TOP—½" Fir Plywood sealed on both sides and hot-spray lacquered or STANDARD TOP—smooth ⅛" Masonite Tempered Presdwood, permanently bonded to ⅜" fir plywood with hot-lacquer finish. Both tops are alcohol and hot-water resistant; have a formed steel molding, painted brown, with black baked enamel framework and buff-colored baked enamel legs. HOSTESS Tables always stand firm and steady because they have an all-steel frame, supporting the entire top, and fully-braced steel legs, paired for fast, easy folding. Write for folder.

Model MP-6-30 Standard Top 72" x 30", seats 8 comfortably  
Model P-6-30 Regular Top 72" x 30", seats 8 comfortably  
Model P-6-36 Regular Top 72" x 36", seats 8 comfortably  
Model P-8-30 Regular Top 96" x 30", seats 10 comfortably  
Model MP-8-30 Standard Top 96" x 30", seats 10 comfortably  
All tables 30" high. Packed 2 to a carton.



### VERTICAL TRUCK.

Allows one man to gather, move, and store chairs with ease. Stores 24 chairs in space 19¾" wide x 42" long x 42¼" high.



### HORIZONTAL TRUCK.

Built for under-stage storage. Carries 36 chairs—39" wide x 62" long x 24" high. Can be hooked in tandem.

### DELUXE FOLDING CHAIRS

Comfortable full-size seat and back—a new standard for folding chairs—is a distinctive feature of HOSTESS DeLuxe Folding Chairs. No longer is it necessary to accept old-style panel, unsteady folding chairs. Installations throughout the nation demonstrate the practical construction, comfort, safety, and attractiveness of Hostess Folding Chairs. Maximum utilization of auditorium-gyms is possible with Hostess chairs and trucks.

Specifications: Improved "X" type construction, with anti-collapse closing. All-steel, all-riveted for strength. Rubber foot pads. Back and seat covered with colorful Duran leatheroid or Terson vinyl coated fabrics. Choice of 5 metallic colors in baked enamel finish. Write for complete, new catalog.





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# HOWE

## ALL STEEL CHASSIS FOLDING TABLES

*for Cafeteria & Classroom*



- Tops are Sanitary
- Impervious to ink, grease, etc.
- Quickly opened, folded and stored
- Occupy small space
- Transferred quickly for other school purposes
- All corners slightly rounded
- Great in strength—Light in weight
- Ample leg room

**Important: A Brace at Each Leg for Extra Strength**

WITH MASONITE TEMPERED PRESWOOD, LINOLEUM, FORMICA, and FIR PLYWOOD TOPS.

### Construction Facts

- $\frac{3}{8}$ " Plywood top riveted to steel chassis;  $\frac{1}{8}$ " Masonite, Linoleum, or  $\frac{1}{16}$ " Formica glued to Plywood for smooth, hard, durable surface with no rivets showing.
- A wonderfully strong foolproof lock. Table locked and braced at every leg, and yet one release point for each pair of legs.
- An aluminum edge around entire top is strong, light in weight and is securely fastened to the top, and can never come loose. All corners are slightly rounded.
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- Heavy steel supporting side and end rails with  $1\frac{1}{2}$ " square tube steel legs with lapped seams, give great strength.
- Standard height 29 and 30 inches. Special heights available at slight advance in price.
- Round glider leg caps, absolutely smooth, protect carpets and floors.

**SIZES:** 24 x 36, 30 x 48, 24 x 72, 30 x 72,  
36 x 72, 24 x 96, 30 x 96, 36 x 96

**Benches and Rounds Are  
Also Available**

**IF IT FOLDS ASK HOWE**

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



**FOR PROJECTION TABLE**  
26" x 14 $\frac{3}{4}$ ", 26 $\frac{1}{2}$ " high  
Folds to 3 $\frac{1}{2}$ "

# MITCHELL MANUFACTURING CO.

2772 S. 34th Street • Milwaukee 15, Wisconsin

MANUFACTURERS OF FOLDING STAGES, BAND AND CHORAL STANDS AND FOLD-O-LEG TABLES

## Mitchell FOLD-O-LEG tables

With tops  
of Tempered  
Masonite Presdwood  
Fir or Birch Plywood  
Formica and Plastics in  
many patterns and colors



The Strongest,  
Handiest Folding  
Table Made!

**MORE** Seating Capacity  
Leg Comfort  
**MORE** Strength, Rigidity  
Exclusive Features

- Smooth, Clean, Sanitary Top unmarred by rivets, nails or screws
- Table Top edges finished with extruded T shaped plastic moulding
- Foolproof, wearproof easy folding mechanism
- Proper pedestal arch width prevents tipping

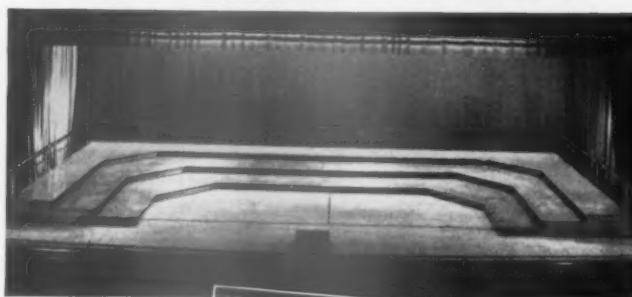
Mitchell FOLD-O-LEG tables are in constant use in Schools, Churches and Institutions. Any room can be converted into a Banquet Hall, Cafeteria, Classroom or special activities room on short notice, or easily cleared in minutes.

### Fold-O-Leg Table Sizes

Length: 3', 4', 6' and 8'. Width: 30" and 36".  
Round Tables: 48" and 60".  
Height: 29" standard *Adult height*, also 24" and 22" for kindergarten and 27" for intermediate age groups.  
Leg Extensions: increase lower height tables to 29".

Write for full information

## Mitchell FOLDING • PORTABLE • STANDS



for BAND  
ORCHESTRA  
CHORAL &  
DRAMATIC  
GROUPS



### IMPROVE APPEARANCE AND PERFORMANCE

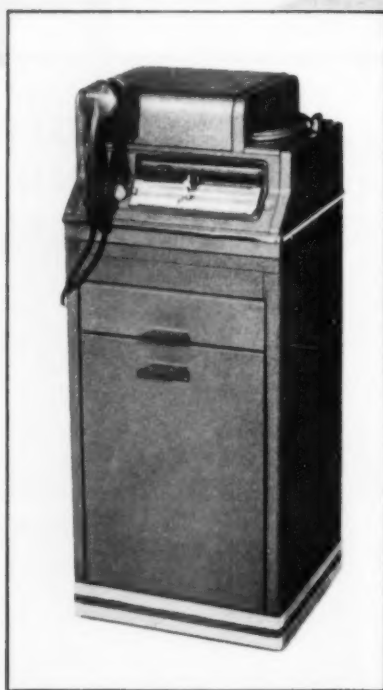
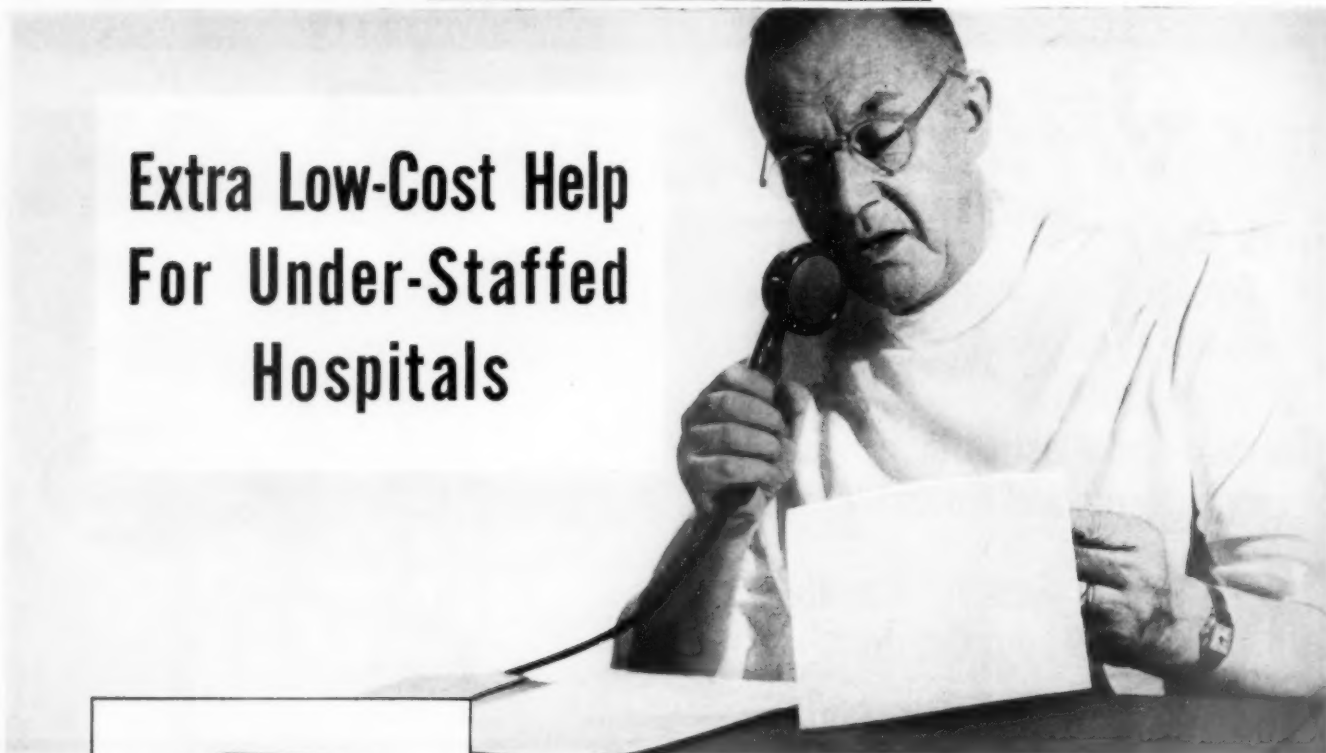
Add "Audience Appeal", assure better acoustics: better discipline: better direction. 3 or 4 elevations available. Sturdy, safe, easy to handle units with tubular steel folding legs... rigid when set up. Complete stand as shown in above pictures stores in a space 4' wide, 8' long and 6' high. You buy only as many units as you need to fit your requirements.

Easy to handle units . . . adaptable to any need.  
Sturdy, attractive, easily folded for storage.

# THE EDIPHONE—THOMAS A. EDISON, INC.

DEPARTMENT OF EDUCATIONAL TRAINING  
Laboratory and General Offices — West Orange, N. J.

## Extra Low-Cost Help For Under-Staffed Hospitals



*Here's a valuable aid for busy doctors and short-handed stenographic departments.*

Use Disc Edison Voicewriter to record instructions, reports and notes. Dictation can be done while information is fresh in the mind . . . transcription can be made when stenographer is available.

Disc Edison Voicewriter gives unmatched *understandability*. Exclusive Ear-Tuned Jewel-Action faithfully reproduces the tricky *s, f, z, th* sounds that often lead to mistakes.

It's the *one* machine that *combines* the convenience of machine dictation and the understanding of direct dictation. Only Edison has Ear-Tuned Jewel-Action.

### HELP YOUR STAFF TO SAVE PRECIOUS HOURS

A graphic presentation of the advantages of the new Disc EDISON VOICewriter in modern hospital administration can be made in five minutes. Phone "EDIPHONE" or write Thomas A. Edison, Incorporated, West Orange, New Jersey. In Canada: Thomas A. Edison of Canada, Ltd., Toronto 1, Ontario.

*Thomas A Edison*



# INTERNATIONAL BUSINESS MACHINES CORP.

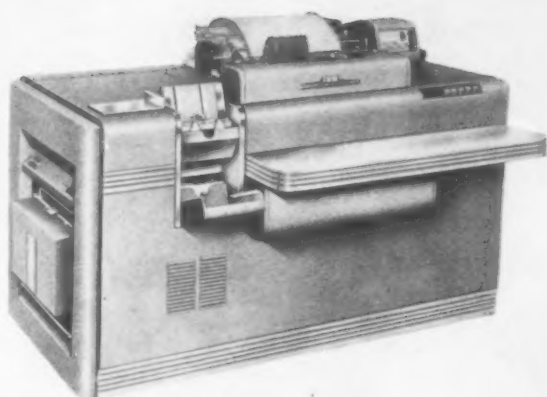


590 Madison Avenue.

New York 22, N. Y.

*Branch Office and Maintenance Locations in Principal Cities*

## IBM Accounting for Schools and Universities



IBM Electric Punched Card Accounting Machines provide a simplified, automatic procedure for registration, administration, and statistical accounting. Time-consuming manual preparation with frequent errors is virtually eliminated.

The registration procedure gives an accurate control of class enrollment, equalizes teaching loads, and provides immediate access to students' records.

The administration procedure furnishes every accounting record and report required.

Statistical analyses for either administration or registration provide figure-facts as needed.

The IBM Electric Test Scoring Machine provides an accurate means of scoring and analyzing objective examinations. Multiple-choice, matching, true-false, like-dislike, agree-disagree, and weighted item tests — all can be scored at the speed of 500-800 tests an hour regardless of whether there are 10 or 150 questions. This time-conserving machine permits a wide expansion of school testing programs.

Special analyses can be obtained through the use of two attachments: the Aggregate Weighting Unit which computes weighted averages, and the Graphic Item Counter which counts the number of pupils who answered each question correctly or incorrectly.

The Test Scoring Machine can be ordered for either AC or DC operation.

A few of the reports available for registration are:

- Advisers' Lists
- Class Enrollment Lists
- Students' Schedules
- Teaching Load Reports
- Grade Reports
- Course Grading Analyses

For administration:

- Payroll
- Operating Statement
- Budget Report
- Accounts Payable



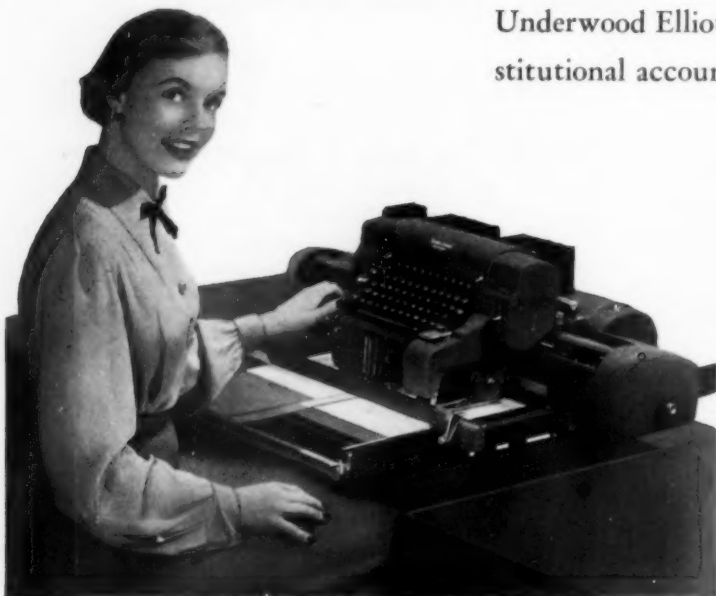
# UNDERWOOD CORPORATION

Manufacturers of Underwood Typewriters, Adding-Figuring Machines  
Accounting Machines and Office Supplies

One Park Avenue, New York 16, N. Y.



## UNDERWOOD ELLIOTT FISHER FOR STUDENTS' ACCOUNTS

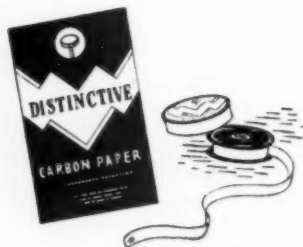


Underwood Elliott Fisher . . . the ideal machine for posting institutional accounting records that require the use of an alphabetical keyboard machine. The Standard Typewriter keyboard and computing mechanism is electrically controlled . . . its speed and easy operation will amaze you.

This machine has a flat writing surface . . . an exclusive feature . . . which makes possible Elliott Fisher's renowned application, flexibility and speed known the world over.



**UNDERWOOD SUNDSTRAND MODEL A ACCOUNTING MACHINE**—To handle students' accounts quickly, accurately and efficiently . . . and with a minimum of time and effort . . . use the Underwood Sundstrand Model A Accounting Machine. The budget-minded school administrator will recognize the wide degree of application versatility of this machine, and the really, truly amazing feature is that it's easily within the budget limitations of the average school.



**UNDERWOOD CORPORATION SUPPLIES**—To convey a good clean impression in every letter you write . . . use Underwood Corporation carbon papers, ribbons and other supplies. Superior supplies result in superior work. Be proud of your correspondence, notes and reports . . . use Underwood Corporation Supplies.



**UNDERWOOD SUNDSTRAND ADDING-FIGURING MACHINE**—This simple, easy-to-learn 10-key keyboard machine facilitates the touch-method of operation and as a result will repay its original cost many times over. The figuring work of every school office, whether large or small, is speeded with the Underwood Sundstrand Adding-Figuring Machine.

• SALES AND SERVICE EVERYWHERE •

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# UNDERWOOD CORPORATION

Manufacturers of Underwood Typewriters, Adding-Figuring Machines  
Accounting Machines and Office Supplies

One Park Avenue, New York 16, N. Y.



## Train Them TODAY on the Typewriters They'll Use TOMORROW!

When you use Underwood typewriters in your classes, you will be giving your students the opportunity of learning faster and more thoroughly . . . because Underwood easy-to-learn-on . . . easy-to-teach-on typewriters will help your students to get off to a good start right from the beginning . . . to develop the correct technique right away. You will be amazed how easy and more satisfying your job will be when you give your students the *real, good* training they deserve. So train them **TODAY** on the typewriters they'll use **TOMORROW** . . . typewriters made by Underwood . . . *Typewriter Leader of the World.*



### UNDERWOOD RHYTHM TOUCH DELUXE

—Visible Front Margin controls and Visible Writing and Centering Scales . . . allow every basic typewriter function to be easily performed . . . and, therefore, easily understood. And Rhythm Touch . . . a result of a perfectly balanced, accurate keyboard . . . helps students develop professional technique and speed right from the beginning. Be sure to get this easy-to-teach-on Underwood Typewriter for your classes.



### UNDERWOOD ALL ELECTRIC TYPEWRITER

—For a *complete* training . . . be sure to include Underwood All Electric Typewriters. They are an integral part of a good, over-all training program as more businesses are becoming aware of the many advantages of this machine every day. Thoroughly prepare your students for the future . . . get Underwood All Electric Typewriters and make your training program complete.



**UNDERWOOD PORTABLE**—An Underwood Portable Typewriter is ideal for personal typing because it provides all the essential operating features of a business size typewriter. A light weight Underwood Portable provides the answer to "How can I get that *extra* work done?"

• UNDERWOOD PRODUCTS SPEED SCHOOL BUSINESS •

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



NATIONAL CASH REGISTER CO.

Dayton 9, Ohio

# **better training equipment means better trained graduates!**

Offices—large and small—are turning to mechanization to cut bookkeeping costs. That's why sales of National Accounting Machines have increased so in the last few years.



In all probability, graduating students of your school will find National Accounting equipment in the office that becomes their place of employment. Be sure your graduates are qualified to operate such equipment. It will mean much to them—and much to your school.

A few minutes with your local National representative may prove very helpful. Call him in today. Ask him to show you why Nationals have become so important in the business world, and why your graduates will profit from a knowledge of National machine operation. Or, write to the Company at Dayton 9, Ohio.

**National**  
ACCOUNTING MACHINES  
CASH REGISTERS • ADDING MACHINES

**THE NATIONAL CASH REGISTER COMPANY**

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



# Remington Rand

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## KARDEX

### ORGANIZES FACTS THE SCHOOL OFFICIAL NEEDS



Safe-Kardex combines certified fire protection with visible control for important school records.

The school administrator, like the businessman, needs ready access to a host of facts — and often has to operate within a rigidly limited budget. What more natural than his increasing reliance on the modern time-saving Kardex? Kardex gives him completely centralized records . . . conserves his time by *selecting* the items which need immediate action . . . helps him make intelligent decisions with a minimum of effort, a minimum of clerical time, too!

PH. 18	PH. 18	PH. 18	PH. 18	PH. 18	PH. 18
TOTAL CREDITS	TOTAL CREDITS	TOTAL CREDITS	TOTAL CREDITS	TOTAL CREDITS	TOTAL CREDITS
PERMANENT SIGNAL INDICATES PROGRESS THROUGH GRADES					
1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	18
19	20	21	22	23	24
25	26	27	28	29	30
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37	38	39	40	41	42
43	44	45	46	47	48
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277	278	279	280	281	282
283	284	285	286	287	288
289	290	291	292	293	294
295	296	297	298	299	300

This visible school record shows how planning can be simplified with Kardex charted facts. Notice the signals on each card which tell the reader, at a glance, specific facts about the pupil. Kardex is being widely used for many school records: Pupil History, Pupil Guidance, Pupil Health, Attendance, and Program; Purchase and Stock, Teacher Placement, Teacher Substitute, Budget, Financial and Textbook Records, Kardex attendance records are especially helpful in keeping the statistics needed to qualify for state aid.



### MAKE PHOTOCOPY TRANSCRIPTS WITH PORTAGRAPH

For preparing transcripts, photo-copying reports and other school records . . . for copying *anything* printed, written, or drawn, you'll find Portagraph a great time-saver — economical too. Portagraph eliminates proof-reading entirely. Needs no darkroom. Requires no special skill to operate (Portagraph is often used by part-time student help). Investigate Portagraph today.

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## GIVE YOUR RECORDS CERTIFIED PROTECTION AGAINST FIRE

**Safe-Cabinets.** Safe-Cabinets are used for protecting general school records. Available in a variety of sizes; certified for one, two, or four hours' protection against fire. Adjustable interior equipment, such as card index drawers, file drawers, document files and shelves, is available.



As many schools have found by sad experience, "fire-proof" buildings offer no assurance that their *contents* won't burn — and ordinary steel files or safes are the best possible conductors of heat which destroys records. In fact, the *only* sure protection for your irreplaceable student records is *certified* protection at point-of-use, which assures their safety 24 hours a day. Your community trusts you with the care of these priceless public records. Place them in Remington Rand Safe-Files or Safe-Cabinets, and you have faithfully discharged that trust.



**Safe-Files.** The new "C" Label Safe-File de Luxe (right) is certified to protect your records from heat of 1700° F. for at least 1 hour. It's a tough file too; it's tested to take a drop through a burning floor, and come through with your valuable papers intact. Other Safe-Files are available for housing cards, and letter or legal size records.

## COUNTER-HEIGHT VERTICAL FILES FOR THE SCHOOL OFFICE

One sure way of combining step-saving efficiency and attractive appearance in the school office is to use Remington Rand Aristocrat 3-drawer files to form the office counter. We supply these files with continuous linoleum tops banded with wear-resistant metal edges. The sturdy construction of Aristocrat files gives a life-

time of service. In planning your files, the knowledge gained by Remington Rand's many years of service to educational institutions is available without obligation.

Modernize your school office with long-lasting Remington Rand desks, chairs.



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315 FOURTH AVENUE,

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



## GIVE YOUR LIBRARY THE FUNCTIONAL BEAUTY OF TREND

You will find in TREND the most beautiful library furniture you have ever seen . . . the most practical . . . the most long-lived. TREND design combines flush construction and rounded corners to eliminate dust-catchers, reduce splintering, and lower your maintenance costs. Whether you are refurnishing an entire library, equipping a new building, or supplementing existing furniture, be sure to see TREND . . . created to answer the demand for modern efficiency *plus* beauty. Write for free booklets "TREND" and "Planning the School Library."



Library Reading Room, Law School,  
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## EXHIBIT CASES OF DISTINCTION

For over 40 years Library Bureau of Remington Rand has supplied exhibit cases of quality for the leading libraries, schools and colleges of America. The case illustrated has the new LB fluorescent lighting from within, which fully illuminates the contents of the entire case.

\* \* \*

*Space permits showing only a tiny fraction of Remington Rand equipment for the school office and library. For full information on any of the products listed in the first 3 pages of this advertisement, call your local office, or write to Management Controls Library, Room AS 50-1, 315 Fourth Ave., New York 10, N. Y.*



**Rand**

NEW YORK 10, N. Y.

# SAVE TEACHING TIME . . . MAKE LEARNING EASIER WITH



THE REMINGTON

*Super-riter*

Yes, progressive teachers and school officials are discovering that there are no typewriters to compare with the new Remingtons when it comes to speed, accuracy and ease of operation.

*The New Super-riter* has been efficiency-tested to serve both as a valuable teaching and learning tool.

*Super-Plus Values!* The Super-riter has everything for effortless typing: tempo-touch typing to respond to the touch and rhythm of the individual operator, exclusive finger-fit keys, a longer writing line, exclusive one-key Keyboard Margin Control, exclusive Fold-a-matic construction for economical maintenance and convenient adjustments . . . you get all these and more with Super-riter.

THE  
REMINGTON  
ELECTRI-CONOMY



THE  
REMINGTON  
NOISELESS



The new Electric Typewriter that permits easier, faster, better typing and helps prepare students for the business world of today. *Electrified Carriage Return* eliminates laborious hand carriage operation; *Exclusive Impression Control* permits making clear legible carbons.

Wherever typists are working together at close quarters there's no typewriter that compares with the Remington Noiseless in eliminating machine clack and clatter at its very source. Freedom of noise allows greater concentration on work — results in increased efficiency and accuracy for career training.

## AN EFFICIENT TYPING STATION

Fully illustrated booklet from Remington Rand's Products and Research Department — describes how to increase office productivity through an efficient typing station. Contains information of value to students and educators. Send for your FREE copy.



## "ELECTRIC TYPING VS. MANUAL"

A valuable booklet of professional information about the advantages of electric typing over manual typing. Based on scientific research from some of the country's largest organizations. 20 pages for quick reading. Send for your FREE copy.

# MAKE SCHOOL RECORD KEEPING... SIMPLE... SWIFT... AND ACCURATE WITH



THE REMINGTON  
PRINTING  
CALCULATOR

THE REMINGTON  
ELECTRIC  
ADDING MACHINE



The *Printing Calculator* assures accurate results — in every phase of figure work. Ideal for attendance records, submitting reports for federal, state and county allocations, compiling intelligence and aptitude data, cafeteria management — for all your figuring work.

The *Electric Adding Machine* is ideal for school record keeping, too. Noise and vibration are minimized because of cushioned power, operation is smoother and faster. Logically placed feature keys insure complete one hand control, provide important savings in time and money.

## REMINGTON RAND SUPPLIES TO MEET EVERY NEED... FOR OFFICE OR CLASSROOM



### THE NEW REMINGTON RAND *Nylex* ... ALL-NYLON TYPEWRITER RIBBON

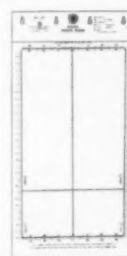
Better typing results are instantly apparent with the remarkable new *Nylex*. Printwork is cameo clear... superfine weave and exclusive ribbon inks assure far longer use... extra length permits fewer ribbon changes.



**Line-a-time Copyholder** — Another progressive education aid is this simple, economical copyholder. Holds note books, flat copy, cards and statistical sheets at a 90° angle for *natural reading*. Errors are prevented, and typing quality improved.



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**Procel Stencils** — Ideal for all types of stencil duplication work. This strong stencil with its plastic coating affords greater sensitivity, makes *PROCEL* especially suited to illustrations and form work... makes cameo clear top quality copies.

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# Remington Rand

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Division of Angus Sneed Macdonald Corporation

Designers, Manufacturers, and Erectors of Metal and Wood Library Equipment  
Orange, Virginia

The Sneed System offers librarians and architects a fully integrated service, based on many years of specialization in the library field, that includes advisory help for library planning, suggested layouts, budget prices and manufacturing.

Plant facilities, comprising 26 acres of floor space, equipped with modern, specialized machinery, are available to us for the rapid and economical production of Sneed wood and metal library equipment.

Sneed library specialists, who know the operation of libraries as well as their design, will work with you and your architects to solve problems connected with flow of books, distribution of space, stack layout, ventilation, lighting, future expansion, and related problems, without obligation. This valuable service will help you to secure a better, more economical and efficient library.

Sneed & Company is ready to assume the entire responsibility for library furniture and equipment contracts, including designing, manufacturing and installation. Wire or write us.

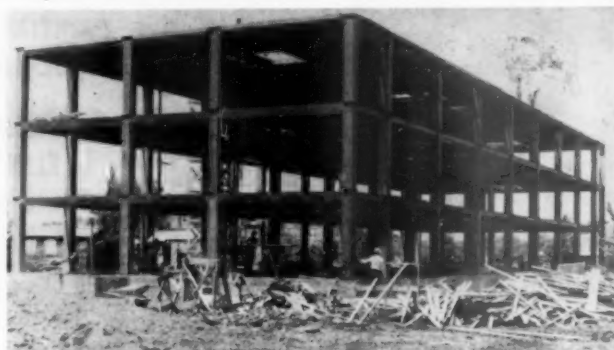
## SNEAD PRODUCTS

Steel Bookstacks, Single and Multitier  
Sneed Modular Construction  
Deck Floors, Concrete, Steel, Marble, etc.  
Stack Stairs and Elevator Enclosures  
Automatic Book Conveyors  
Carrels, Study Units and Office Enclosures  
Movable Partitions  
Louverall Ceiling Lighting & Acoustical Treatment  
Stack Accessories

Wood Library Furniture and Equipment, newly designed and improved functional value and charm.  
Charging Desks  
Catalog Cases  
Tables  
Shelving  
Exhibit Cases  
Chairs  
Technical Equipment  
Study Units



Sneed Bracket Stack, showing concrete deck floors with asphalt tile, book conveyor station and Sneed Stack Aisle Reflectors



Sneed Modular Construction. Hollow steel columns and girders take care of the distribution of air for ventilation and air-conditioning, eliminating costly and space-consuming sheet-metal ducts and making fresh air available over the entire floor area



Sneed double-faced free-standing bracket stack with full-width ends



Sneed tables and chairs of special design in the reading room of a university library

## PARTIAL LIST OF SNEAD SYSTEM POST WAR INSTALLATIONS

University of Alberta	Edmonton, Alberta
University of British Columbia	Vancouver, B. C.
University of California	Los Angeles, Calif.
Hardin-Simmons University (Modular Const.)	Abilene, Texas
Louverall Lighting	Louvain, Belgium
University of Louvain (1)	Minneapolis, Minn.
University of Minnesota (Book Conveyor)	Albuquerque, N. M.
University of New Mexico	Princeton, N. J.
Princeton University (Book Conveyor)	Scotland
St. Andrew University (2)	St. Peter, Minn.
Gustavus Adolphus College	Ames, Iowa
Iowa State College Atomic Laboratory	Syracuse, N. Y.
LeMoyne College	Seguin, Texas
Texas Lutheran College	State College, Miss.
Mississippi State College	Fargo, N. D.
North Dakota Agricultural College (Modular Construction)	New York, N. Y.
United Nations Library and Secretariat (Conveyors)	Victoria, B. C.
Parliamentary Library of Victoria	Lima, Peru
National Library of Peru (1)	Edinburgh, Scotland
National Scottish Library (2)	Sydney, Australia
National Library of Sydney (3)	France
Archives of the Marne (1)	St. Paul, Minn.
St. Paul Public Library	Paris, France
Library of the Ministry of Fine Arts (1)	St. Paul, Minn.
Luther Theological Seminary	St. Paul, Minn.
St. Paul Seminary	Nashville, Tenn.
Tennessee Agricultural and Industrial Institute	Grand Forks, N. D.
University of North Dakota Law Library	Ypsilanti, Mich.
Michigan State Normal College	Chicago, Ill.
Midwest Inter-Library Center	

- (1) In cooperation with Forges de Strasbourg, Strasbourg, France.
- (2) In cooperation with Luxfer Ltd., London, England.
- (3) In cooperation with Steelbilt Ltd., Sydney, Australia.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# Art Metal Presents . . .



## MODERN METHODS AND EQUIPMENT *for Successful School Management*



### ADMINISTRATIVE AIDS FOR SCHOOLS AND COLLEGES

In the following pages we show a functional application of the products and services of the Art Metal Construction Company, to modern school building situations. For the administrative office, there are modern desks, tables, book-cases and Postindex visible index files. For the library, laboratory, shop, lecture rooms and store rooms, there are functional correct tables, cases, work tables, cabinets and other furniture — all of metal and built to Art Metal's regular high standards.

Architects and school executives are invited to make use of our consulting staff in planning of school administrative offices, libraries and other departments.

### ART METAL CHAIRS REDUCE TEACHING FATIGUE

Superbly designed and smartly styled to meet the trying requirements of today's crowded classrooms, the *new* Art Metal Aluminum Chairs increase the teaching efficiency and morale of teachers by providing them with greater comfort through *correct seating* while they work.

Made of anodized aluminum that will not stain or mar . . . padded with foam latex . . . covered with ventilated, plastic-coated fabric in a choice of three colors and built to give years of dependable service and to permanently retain their smart natural appearance.



No. 701 Arm Swivel Chair  
(ideally suited for lecture rooms  
and offices)



No. 707b Teacher's Posture Chair  
(with "Tilt-Action" seat and  
"Live-Action" back)

**ART METAL CONSTRUCTION CO., JAMESTOWN, N. Y.**  
BRANCH OFFICES  
BALTIMORE, BOSTON, CHICAGO, CINCINNATI, DETROIT, HARTFORD, LOS ANGELES, NEW YORK, PHILADELPHIA,  
PITTSBURGH, WASHINGTON, D.C.,  
SALES AGENTS IN ALL OTHER PRINCIPAL CITIES



## ART METAL ADMINISTRATIVE OFFICE EQUIPMENT

### EFFICIENCY STARTS WITH THE CHAIRS AND DESKS

A Posture Chair properly adjusted for correct seating comfort and a desk especially designed to meet the working requirements of the individual user are the basic tools in any office anywhere.

Art Metal Posture Chairs, with the exclusive "Tilt-Action" seat and "Live-Action" back are fully adjustable to the particular seating requirements of the individual user by means of four easy adjustments for correct height of seat, back, angle of back support and proper tension of back.

For the finest desks made choose from Art Metal's complete line of "Work planned" models for executive and all desk workers. They have everything — good appearance, durability, greater convenience and many extras found in no other desks.



#705 Executive Posture Chair

Available in a wide selection of coverings. Seat 21" wide, 18 3/4" deep; back 17 3/4" wide. Height adjustable 18 3/8" - 21 3/8".



#709 Secretarial Posture Chair

Reduces fatigue, increases working efficiency. Seat 16" wide; 14" deep; back 12 1/4" x 7 1/4". Height Adjustable 17"-20".



#704 Side Chair

Seat and back: Fabric over foam latex cushion and contoured pan. Seat 17 1/2" wide, 16 1/4" deep, 18" high. Overall height 33 1/2".



Grade School Principal's Office Showing Art Metal Installation.

### ART METAL SAFES PROTECT VITAL SCHOOL RECORDS



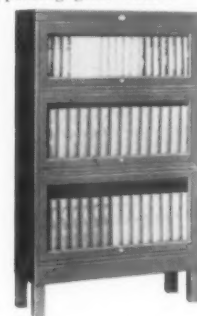
Style #180-20, Class "A"  
43 W. 83 1/8 H. 31 5/8 D.



Style #171-19 Class "B"  
41 W. 67 1/8 H. 28 5/8 D.

### ART METAL SECTIONAL BOOKCASES

These sectional steel bookcases are strongly built to give lifetime service and have smooth easily operating disappearing glass doors.



The bookcase consists of one each of three sizes of sections with top and base.

### ART METAL FILING EQUIPMENT SAVES TIME AND EFFORT . . . PAYS FOR ITSELF!

There is an Art Metal File to meet every need of the School Administrative Office in the complete line of Art Metal Files. Ball-bearing Roller Cradle suspensions permit heaviest laden drawers to roll at the touch of a finger at no increase in cost. All Director Line Files may be equipped with Art Metal Speed File Spacers for quicker filing and finding. Snap-out guide rods, an exclusive feature save time in setting up index guides. All drawers extend fully beyond front of case — from top to bottom all are 100% usable. Through the use of Substitute Drawer Inserts a complete filing system for the small business office may be built up in one unit. Write for SIMPLIFIED FILE ANALYSIS.

### ART METAL VERTICAL FILES



Style 7341  
2 Dr. Letter File  
14 1/16 W. 30 1/16 H.  
28 3/16 D.



Style 7441  
5 Dr. Letter File  
14 1/16 W. 58 1/2 H.  
28 3/16 D.



Style 7641  
4 Dr. Letter File  
14 1/16 W. 51 1/16 H.  
28 3/16 D.



Style 4341T  
3 Dr. Letter File  
14 1/16 W. 41 2/32 H.  
28 3/16 D.

### SUBSTITUTE DRAWER INSERTS



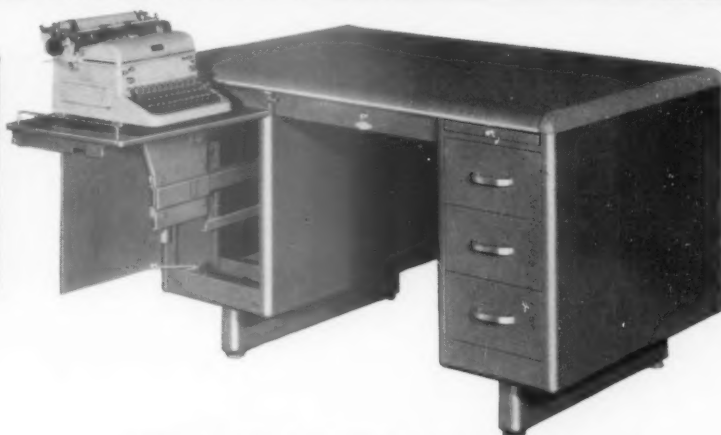


ART METAL gives you the MOST in functional efficiency and appearance!



**EXECUTIVE'S AIRLINE DESK, STYLE 1760FB-32**

A desk of modern design originated by Art Metal providing the utmost in desk value — "Artolin" tops, satin finished aluminum hardware, adjustable footings assure level desk top even though floor may be uneven. Conveniently arranged drawers quietly and easily carry maximum loads on progressive roller bearing suspensions. Thirty styles and types of desks and tables are available for all forms of school work. Write for catalog.



**SECRETARIAL AIRLINE DESK, STYLE 1750TR**

A Secretarial Desk incorporating advanced engineering and construction refinements in an improved Fold-O-Way device eliminates vibration and assures a stronger, firmer platform and pedestal. The greatly enlarged platform area accommodates any standard electrical typewriters and permits use of mechanical copy holders without sacrificing space or convenience.

### SPACE SAVING ART METAL COUNTERS

Counters can be used to advantage in the school administrative offices as partitions and work tables to provide abundant filing capacity for all the books and records that are called upon or referred to in counter transactions. Counters may be assembled of many combinations of individual units to meet specific requirements.

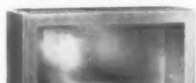
Style 1002, Top 2 1/4" H.



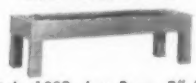
Style 1012, 12" H.



Style 1014, 14" H.

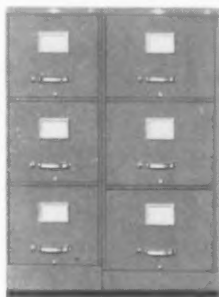


Style 1016, 16" H.



Style 1009, Leg Base, 9" H.

ALL SECTIONS, 32 3/4" W., 10 3/4" D.



Style 4341T  
3 Dr. Letter  
File

Style 4345T  
3 Dr. Cap  
File

Style 4318  
Post  
Gate



Style 4349T-7  
7 Dr. 6" x 4"  
Card File

Style 4351T-6  
6 Dr. 8" x 5"  
Card File

Narrow  
Knee  
Space  
Unit

Style 4347T-9  
9 Dr. 5" x 3"  
Card File

Style 4334T  
Single  
Cupboard  
(Receding Door)

### WIDesections AND HALfsections



Style 212  
5 x 3 Card Index



Style 216  
6 x 4 Card Index



Style 220  
8 x 5 Card Index



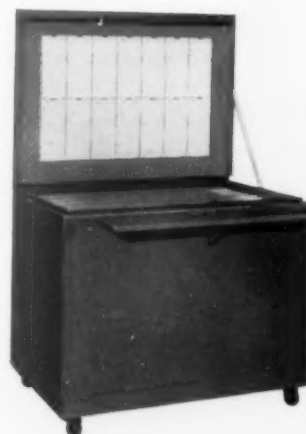
Style 228  
9 x 6 Card Index



Art Metal Widesections and Halfsections provide the most practical method of setting up a small but diversified filing system. Pictured above is a complete, compact filing system exactly suited to the requirements of a small office.

### ART METAL PLANFILES FOR THE SUPERINTENDENT OF BUILDINGS AND GROUNDS

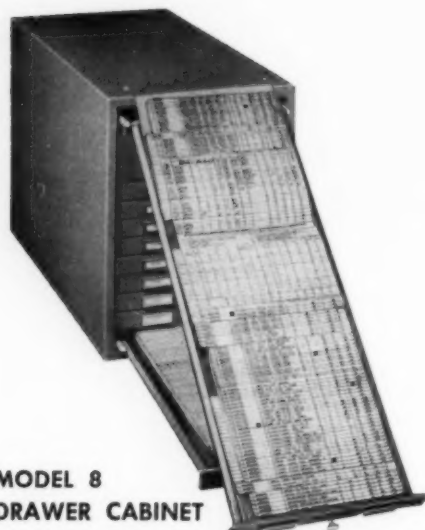
Spring pocket compressors, the exclusive feature of Art Metal Planfiles, serve as "Mechanical hands" holding drawings in place in an upright position by constant compression thereby protecting them against wear and tear so unavoidable in flat plan drawers. The Capacity of one Planfile (3,000 to 5,000 separate sheets — tracings, blue prints, drawings, sketches) is equal to that of 30 flat plan drawers. Planfiles will accommodate drawings up to 58" wide while Filler Pockets, with folds of varying depths, are used to file drawings of various size.



Write for free catalog.

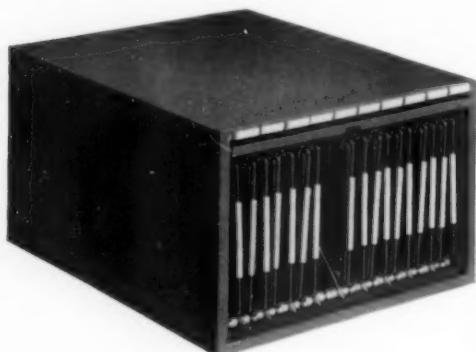


# POSTINDEX "VISIBLE INDEX" FILES SIMPLIFY SCHOOL RECORD KEEPING



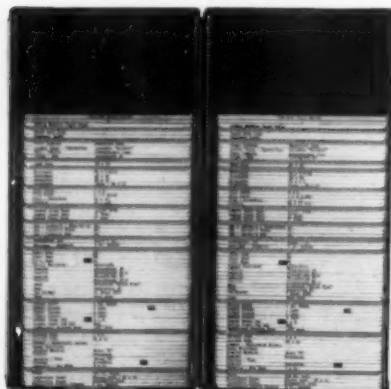
**MODEL 8  
DRAWER CABINET**

Generally accepted as standard equipment for schools, the cabinets are made in four styles: Standard, Deep Drawer, Hinge-Clip, Pocket Holder — each designed to meet a wide range of specific needs. Available in capacities ranging from 500 to 2,500 records. Cabinets made in units of 7, 9, 13, 18, and 20 drawers and a wide variety of card sizes. New improved slide suspensions.



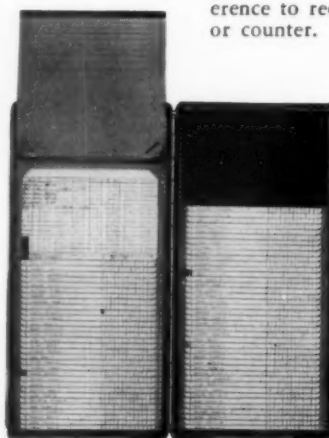
**MODEL 5 CABINET**

Furnished in capacities of 10 and 20 regular Flat Books and in 8 and 16 wide hinge cabinets (for use with multiple forms). Cabinets are only 20 inches in depth leaving ample working space on the ordinary desk. Post-index Flatbook Cabinets afford access to more records in a given amount of space.



## FLAT BOOK WITH STANDARD FORMS

Provides maximum capacity in minimum space. Lies flat on the desk and is easy to post. Available for 5 x 3, 6 x 4, 10 x 5, 10 x 6, 11 x 5, 11 x 6, 12 x 5 and 12 x 6 four page forms or cards. Capacities vary from 160 four page forms in the 5 x 3 Flat Book to 130 four page forms in the 12 x 6 size. Double these capacities if two four page forms are hung on one wire — in the latter case wide hinge books are advisable.



## FLAT BOOK WITH POCKETS

Where portability of work-needs require the frequent activities of more than one person, Flat Books prove exceptionally valuable. Single Books are compact, fully protected, portable units. When equipped with celluloid-tipped Kraft pockets, a simple transfer of already existing card installations to the Postindex way is permitted. Pockets for 5 x 3, 6 x 4, and 8 x 5 cards available. Capacities range from 64 to 240 records.

## POSTINDEX IN SCHOOLS

The volume of records required by the staff of an individual school and the administrative offices necessitates the use of forms and record systems that are condensed for economy of space, yet comprehensive enough to include all details of needed information.

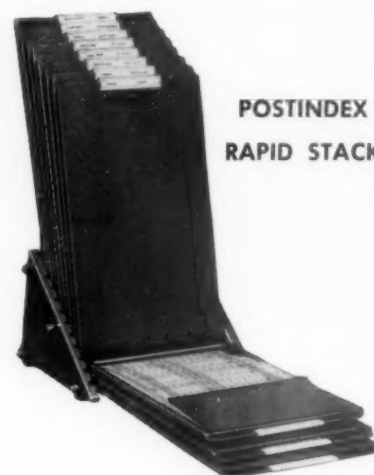
Postindex Visible Filing Systems are set up to fill these specifications. The three main divisions of school records: CHILD ACCOUNTING, TEACHER AND STAFF PERSONNEL, ADMINISTRATIVE RECORDS — are subdivided to meet the requirements of individual schools under the regulations of State, County, and City Boards.

Over a period of many years, Post-index has been called upon to assist school administrators and officials in establishing efficient record systems and controls. As a result of this experience, a high standard of excellence has been achieved in covering all vital information with records that do not add bulk to the files.

These records, filed in convenient Postindex Filing units, are always accessible, easily operated, and convenient for quick reference. The record systems are flexible enough to permit as many subdivisions within the three main classifications as are needed to tell a complete story.

## LIBRARY OF FORMS

A library is maintained of more than 20,000 Postindex Forms from which Postindex users may select the ones they want. If you have a special situation not covered by one of the library forms, Postindex engineers will design a special form to fit your individual requirements.



**POSTINDEX  
RAPID STACK**

The fastest posting equipment available for jobs requiring exceptional speed. 300 cards visible at one time . . . left hand "spots" the facts and does all the handling. Right hand is always free for posting. Records in vertical position . . . out of the way when not in use. Panels lift out and can be replaced instantly. Complete portability.



**ROTARY PROGRAM STAND**

Provides for visible indexing of each pupil's daily program. Every record housed is quickly, easily available. Each panel is doubly indexed and can be removed individually. Sloping standard holding panel is mounted on rotating base assuring easy reference to records from either side of a desk or counter.

P

lease send me further information regarding products checked below:

- |  |  |
|--|--|
| <input type="checkbox"/> Art Metal Desks           | <input type="checkbox"/> Art Metal Safes               |
| <input type="checkbox"/> Art Metal Aluminum Chairs | <input type="checkbox"/> Art Metal Sectional Bookcases |
| <input type="checkbox"/> Art Metal Vertical Files  | <input type="checkbox"/> Modern Records for Schools    |
| <input type="checkbox"/> Art Metal Plan Files      | <input type="checkbox"/> Art Metal Library Equipment   |
| <input type="checkbox"/> Art Metal Card Indexes    | <input type="checkbox"/> Exhibit and Display Cases     |

It is agreed that I am not obligated in any way in making these requests.

Name ..... Title .....

School .....

Address .....

City ..... State ..... AD 2082 PC 50



FIRST CLASS  
Permit No. 1  
Sec. 34.9, PL&R  
Jamestown, N.Y.

**BUSINESS REPLY CARD**

No Postage Stamp Necessary if Mailed in the United States

POSTAGE WILL BE PAID BY

**ART METAL CONSTRUCTION CO.**

**JAMESTOWN, N. Y.**



# POSTINDEX ACCUMULATES FACTS ABOUT PUPILS . . .

KEEPS INFORMATION READY FOR INSTANT REFERENCE BY SCHOOL OFFICIALS . . .  
GIVES YOU THE SIMPLEST FORMS FOR ANY RECORD REQUIREMENT.

## CHILD CENSUS AND ATTENDANCE

Designed for use by local attendance supervisors, this form coordinates a variety of information. The front page is a complete attendance follow-up showing dates absent, causes of non-attendance and disposition of each absence. The visible margin shows the child's full name and race.

The first inside page contains general information with yearly record of attendance and residence from birth until the age of 20. The second inside page provides space for exemption from school attendance with causes and record of approved home instruction. It also includes complete employment data if the student is employed.

The fourth page is a complete summary of attendance by years. A card of one color is used for boys and another for girls to facilitate segregation when desired.

## JUNIOR-SENIOR HIGH CUMULATIVE RECORD

A four page cumulative record covering three years of Junior High School and three years of Senior High School. Indexed under the pupil's name, the visible margin contains a chart which is marked with a celluloid signal to show progress. Space is also allowed for course of study and vocational choice. The first page is for the Junior High School Record, the back page shows the Senior High School Record

These two pages are similarly set up. Each subject is shown on a separate line and passes through a breakdown of weeks, units and periods; estimate, test, and quarterly average, and total average with final marks and date and results of State examinations. The inside pages are the permanent record. Page 2 contains personal history, a quarterly summary of six years attendance and such personal data as special abilities, disabilities, college entered, honesty, effort, etc.

Page 3 is a record of diplomas — data on preliminary certificate and High School Diploma and a summary of pupil's standing.

WRITE FOR FREE SAMPLES OF ANY OF THESE STOCK FORMS FOR SCHOOL RECORDS OR SEND FOR FREE POSTINDEX BOOKLET "MODERN RECORDS FOR SCHOOLS":

Child Accounting  
Enrollment, Daily Program, Attendance  
Individual Child Census  
Child Census And Attendance  
Elementary-Secondary Cumulative Record  
Secondary School Cumulative Record

Elementary-Junior High Cumulative Record  
Senior High School Permanent Record  
Junior-Senior High Cumulative Record  
Physical Education Records  
Purchase Record  
Maintenance Record  
Administrative Inventory

State Accounting Record  
Vocational Training Program  
Central School Record  
College Room Schedule  
University Record of Student Loans  
Students College Work and Payment Record



# ART METAL BOOKSTACKS OFFER THE MOST PRACTICAL AN



## ART METAL "UNITYTYPE" BOOKSTACKS

Shelves of "Unitytype" Bookstacks are interchangeable with shelves of built-to-order installations.

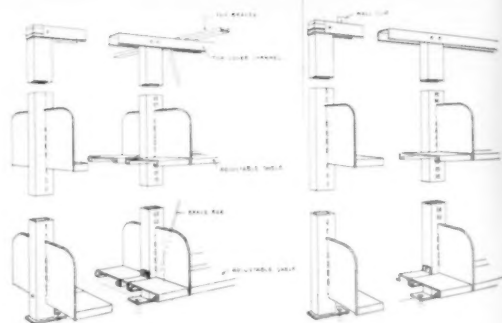
Two types of Unitytype Bookstacks are available, the free standing type which meet all requirements for wall stacks or single free-standing stacks, and top-braced units. The top-braced type is recommended when several ranges of one-story bookstacks are used with average aisle space between each range.

Art Metal representatives are qualified to discuss your book storage requirements and will submit a floor plan for the most practical and economical arrangement of your library bookshelves.

## CONSTRUCTION DETAILS

Each double-faced section contains 14 shelves adjustable 1" on centers; stack 90" high o.a., 8" deep, center dimension.

Each single faced section contains 7 shelves adjustable 1" on centers; stack 90" high o.a., 8" deep, center dimensions.



Top-Braced Stack Double-Faced

Top-Braced Unit Single-Faced



FREE-STANDING UNIT, SINGLE-FACED

The single free standing stack meets all requirements for wall stacks.



TOP-BRACED STACK, DOUBLE-FACED

The top-braced bookstack is recommended for locations where it is undesirable to use floor fastenings. Top bracing makes floor fastening unnecessary.



# CAL AND ECONOMICAL ARRANGEMENT OF SCHOOL LIBRARY BOOKSHELVES



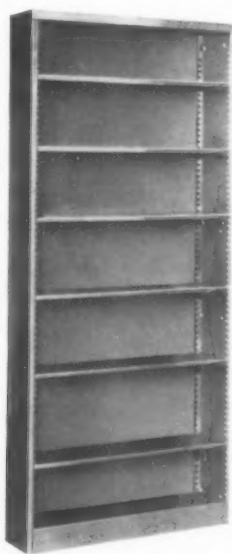
View of main aisle at third stack level. Bookstack ranges with open ends, range indicators and concealed raceways for wires to control switches. Ventilating grills for circulation of air in bases.



Art Metal bracket type three tier bookstack installation supporting the first building floor. Full width range ends supplied where specified as an optional feature.

## ART METAL 2000 LINE BOOK UNITS FOR THE SCHOOL CLASSROOM

Made with detachable finished ends so that one or more sections can be assembled into a single book stack unit.



Book unit with detachable finished ends in position  
Style 2000—84" high, 37 1/4" W., 9" H.



Style 2002  
End Panel 84" high



Book unit without finished ends.  
Used for additions to original unit  
Style 2001—84" high, 36" W., 9" D.

5" Detachable Label Holder for Shelf Front



Two Style 2001 units with one pair Style 2002 Detachable Finished Ends



## ART METAL EXHIBIT AND DISPLAY CASES CREATE EFFECTIVE EDUCATIONAL DISPLAYS. HERBARIUM CASES FOR SPECIMENS



This recessed wall case, recently installed in a new school building, has sliding doors and semi-indirect lighting which emanates from behind the central pilaster. Cases of this kind are particularly advantageous in displaying educational exhibits.



**CABINET TYPE CASE WITH SHELVES.** Glass or solid backs optional.

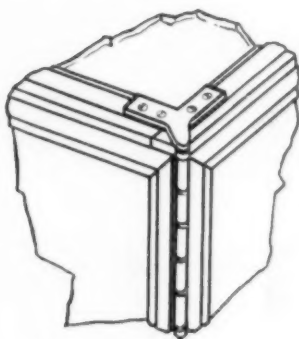


**FREE STANDING CASE** with lights in each corner section.



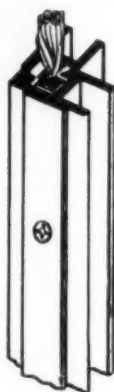
**HERBARIUM CASE.** Felt  $\frac{1}{8}$ " thick on door strikes assures vermin proof seal. Sketch shows two cases joined by intermediate upright.

## CONSTRUCTION DETAILS



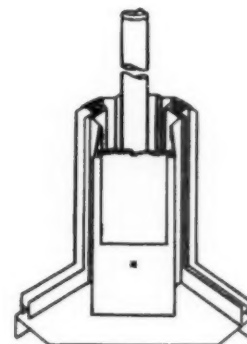
**CORNER SECTION**

Showing pivot plate which distributes hinge load to entire case.



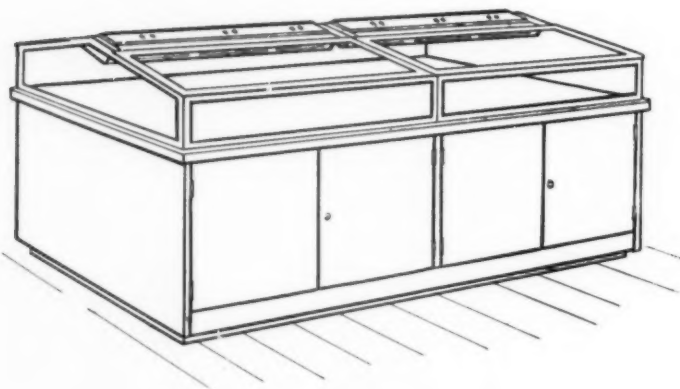
**CORNER SECTION**

Typical closed corner section which illustrates method of dust proofing.



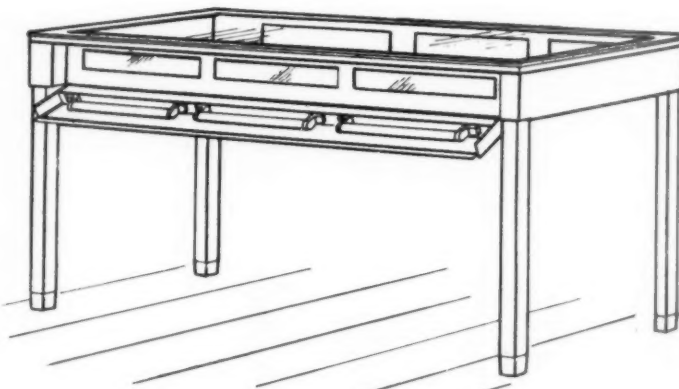
**SECTION SHOWING PILASTER LIGHT**

Pilaster light creates minimum of heat, cuts down cross sectional area behind obscure glass, minimum shadows with even light throughout case. Lights can be removed from outside case.



**SLOPE TOP CASE**

Double faced lights in this case through center.



**TABLE TYPE CASE**

Lights in the sides. Shown with lighting panel open for access.

CABINETS CAN BE MADE TO ANY SPECIFIED SIZE OR SHAPE

**ART METAL CONSTRUCTION CO., JAMESTOWN, N. Y.**

# UNIVERSAL STEEL EQUIPMENT CORP.

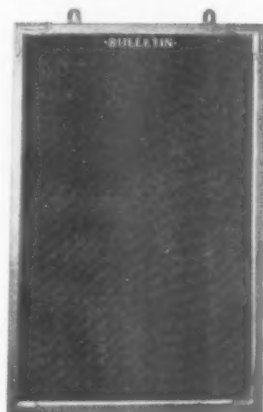
32-33 47th Avenue, Long Island City 1, N. Y.



"Since 1907"

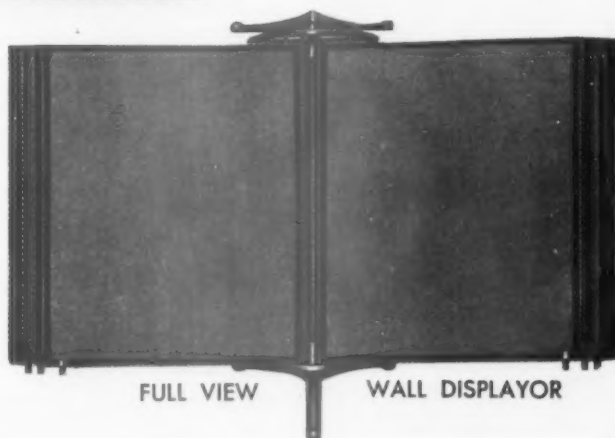
- DISPLAY FIXTURES
- BULLETIN BOARDS
- STEEL SHELVING
- SMALL PARTS BINS

UNIVERSAL STEEL PRODUCTS... are backed by over a quarter of a century of experience in specializing in the design and manufacture of high quality steel equipment for schools, colleges, libraries, museums, etc.



**BULLETIN BOARDS**  
For posting notices, schedules and printed matter. Universal Bulletin Boards are sturdy and neat in appearance. Finished in Green Enamel or Antique Bronze.

FLOOR DISPLAYOR



FULL VIEW

WALL DISPLAYOR

**UNIVERSAL "SWING-WING" DISPLAYORS \***  
Wall and floor model display fixtures—provide perfect visual display of maps, charts, photographs, drawings, statistical data, in a minimum space. Ideal for class rooms, lecture halls, laboratories, administrative offices and libraries. Metal parts finished in durable baked-on green enamel or crinkle antique bronze. Circular D-50.

\* Trade Mark

Available in Other Models, Types and Sizes—or Built to Your Individual Specifications



## UNIVERSAL "UNIFLEX" STEEL SHELVING

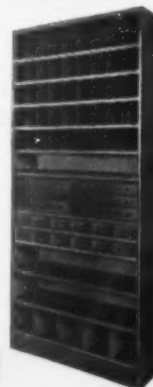
Exclusive Construction Features  
Bolt-less — Adjustable without use of tools.  
Sturdy — Neat — Flexible to varying needs.  
Quick-Easy to assemble and rearrange.  
Finished in Durable Baked-on Olive Green Enamel or color desired.  
Available in a wide range of standard sizes, or built to your individual requirements.  
Ask for Circular S-48

CONSULT US ON YOUR INDIVIDUAL REQUIREMENTS—NO OBLIGATION

WRITE FOR CATALOG AND QUOTATIONS ON YOUR NEEDS

## UNIVERSAL STEEL PARTS BINS

For stock control and storage of small items. Ideal for pipe fittings, electrical supplies, tools, etc.—with the Universal exclusive "SLIDE-KLIP" for easy and instant adjustment of compartments to size desired. Equipped with boxes, drawer units and label holders. Available in over 15 models. Circular PB-50.



THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



# DIEBOLD, INC.

1533 Fifth St., S. W., Canton 2, Ohio

## Diebold offers schools record systems

Here are a few of the models of equipment that make up the Diebold Systems and protection lines used by the most progressive schools everywhere.

For complete data call your Diebold Man or write... Diebold, Inc., Canton 2, Ohio



### Cardineer Rotary Card Files

#### Master Cardineer

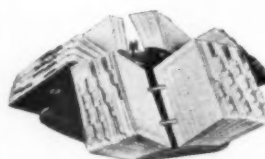
Only Diebold can give you Cardineer! This model available in both hand and motor operated types. Accommodates cards 8" x 5". A turn of the rotor brings 5,500 records per unit to the operator for convenient desk high posting and reference.

The Master Cardineer is the only rotary file offering these facilities . . . (1) removable segments to divide work . . . (2) three edges of cards exposed for guiding and flashing . . . (3) open rotor sides for offsetting . . . (4) desk top or direct rotor posting optional . . . (5) segments for holding double rows of cards . . . (6) 30" of cards visible at all times.



#### Desk Model Cardineer

Choice of two models. Single rotor capacity 1,500 records. Double rotor capacity 3,000 records—both for any size card up to 6" x 4".



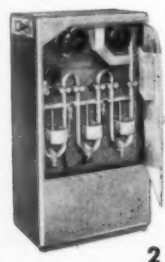
#### Desk Model Cardineer (Large)

This model revolves in a horizontal plane. The three card holding sections are removable for division of work. Capacity: 2,500 cards. Accommodates sizes 6" x 3½" to 8" x 8" or 9" x 5½".

### Flofilm—The complete microfilming process

Diebold Flofilm is a self-contained microfilm process consisting of three coordinated units (1) Camera (2) Automatic film processor (3) Reader—for projecting images in original sizes for reference or copying. Your original records never leave the premises; film is automatically processed in the confidence of your own office within one hour after exposure.

The bulk of stored records—historical, irreplaceable, invaluable—can be reduced 99% when reproduced the Flofilm way. Store extra copies of the film off the premises for extra protection against fire loss. Back reference to filmed media can be faster than with the original through properly applied indexing methods.



### Reveldex



For rapid reference jobs. Rotors revolve together or independently as desired. One base will hold a number of rotors, each with a capacity of 1,600 records; card sizes from 2½" x 3" to 6" x 6".

# complete and protection

Diebold *Systems* RECORD-HANDLING



MICROFILM • ROTARY, VERTICAL AND VISIBLE FILING  
EQUIPMENT • SAFES, CHESTS AND VAULT DOORS •  
BANK VAULT EQUIPMENT • BURGLAR ALARMS

## Fire Resistive Safes



Diebold's reputation has been built on record protection equipment. Tested by Underwriters' Laboratories for endurance in 1, 2 and 4 hour fires, plus drop and explosion tests. Any arrangement of safe interiors can be provided.



## File Storage Room and Book Vault Doors

File Storage Room doors carry fire ratings of  $\frac{1}{2}$  hour and 1 hour. Book Vault doors are rated at 2, 4 and 6 hour fire endurance. All doors bear Underwriters' Laboratories labels and are equipped with relocking and unlocking safety features.



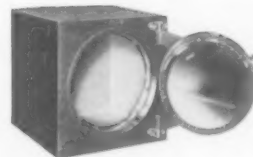
## Tra-Dex Vertical Visible Files

Adds visibility to vertically filed records for speedy glance finding and faster processing. Makes visual checking and control possible by exposing columns of entries. Visible margins can be  $\frac{1}{2}$ " to 3" wide. Available in portable sections and large capacity manifold styles for cards up to 12" high in any width.



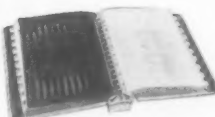
## Safe-T-Stak Steel Storage Files

Reduce storage space requirements up to 40%. Can be interlocked vertically, side-by-side, and back-to-back for maximum safety. Fully loaded drawers open easily, even when stacked ceiling high.



## Cashgard Chests

Eliminate burglary and hold-up hazards. Protect your funds in a Diebold Cashgard Chest. Reduced burglary insurance premiums will soon repay the full cost.



## Flex-Site Loose-Leaf Visible Binders

Models and sizes taking up to a thousand or more records per unit. Form sizes from  $2\frac{3}{8}$ " x  $7\frac{1}{2}$ " to  $15\frac{1}{2}$ " x 18" or larger. Especially applicable when flexibility, portability, compactness, low cost and easy fire protection are important factors.



## Multi-Flex

To extend the advantages of individual Flex-Site units (described above) to larger installations. All necessary operations are performed without removing the individual Flex-Site units. 10,000 records easily housed in this manner.



## V-Line Posting Trays

Automatic "V" eliminates "getting ready to post" operations... reduce "machine waiting time" between postings... increase overall record production. Adaptable to any form up to 17" x 14" on bond, ledger or index bristol.



## THE GLOBE-WERNICKE CO.

Norwood, Cincinnati 12, Ohio

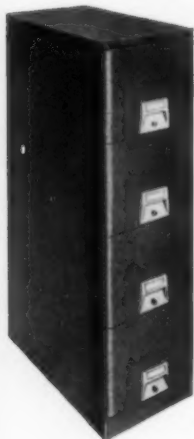
*Engineering Specialists in Office  
Equipment, Systems, and Visible Records*

THE heavy and increasing load of administrative work in educational institutions calls for the best of time-saving and labor-saving equipment. For nearly seventy years Globe-Wernicke has led in the development and improvement of such equipment.

Countless business concerns have proved to their complete satisfaction that G-W furniture, equipment and office systems are engineered up to the exacting requirements of continuous business service. Their experience is confirmed by the great number of schools and universities where G-W equipment has been the choice for many years.



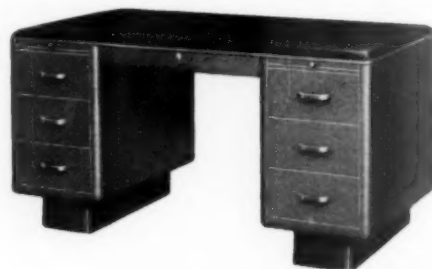
### LET-R-GUARD STEEL FILE



Smartly styled; full flush front, tri-purpose plastic drawer-pulls. Seal gray or green finish. Efficient, smooth, quiet operation. Wrap-around construction eliminates seams, gives greater rigidity. Drawers glide easily, smoothly, and quietly. Positive action followers are adjustable every inch; one-hand adjustment. Available in 4-drawer letter and legal sizes; also with inserts for cards, checks, documents.

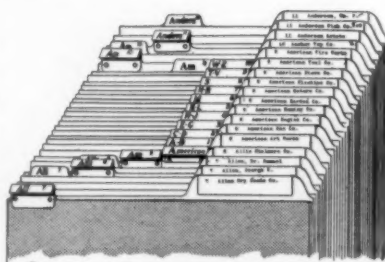
### STREAMLINER STEEL DESKS

Embodying the latest advances in design and construction, these desks offer many features such as roomy, smooth-operating drawers, interchangeable box drawers, extra foot room. Available in various models; finished in green or seal gray. Free circular on request.



### SAFEGUARD FILING SYSTEM

So completely simple and practical that the newest clerk can file papers accurately, find them quickly; so adaptable that it can be expanded to meet any size filing needs.



### ANGULAR CELLULOID TAB GUIDES



They look you in the eye—make filing and finding quicker and easier. No metal to obstruct view of the tab. Long-lasting because tab gives with the guide. Exclusive construction carries pressboard shoulder to top of tab for extra strength. Rounded corners on guides prevent dog's-ears.

### STEEL VISIBLE RECORD EQUIPMENT

Actual time studies show that Globe-Wernicke Visible Record Equipment can save up to 33 1/4 minutes out of every hour spent in finding and refiling card records. You pull out a tray and the cards are visible for swift identification; flip up the one you want—it stays put so you have both hands free to jot down notes or make entries. Cards are easily removed and replaced, yet can't come loose till you release them.

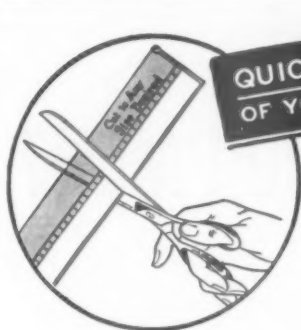


### All Types of Stock and Special Forms Available

Wide application of Globe-Wernicke Visible Records has enabled us to collect a tremendous variety of stock forms. To meet special needs, our Records Engineers will be glad to design and supply you with special forms.

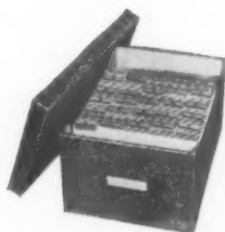
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### NON-INFLAMMABLE U-MAK-A INDEX TABS

Key your catalogs, directories, text books... quickly, easily, inexpensively. Attractive selection of bright colors. Strip type tab.



### AGATE CARD INDEX TRAYS

Thrifty and practical. Stout construction for long service. Removable lid is dust-proof. Follower block on counter-sunk rod keeps cards upright. All standard card sizes and check size.



### BOX FILES

Popular for current letters, bills, and invoices. Students and writers like them for lecture notes, reports, and manuscripts. Indexed A to Z or 1 to 31. Suitcase lock.

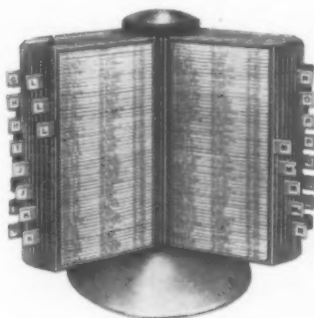


### FANFOLD LABELS

Essential for labeling file folders, and a "best buy" for every labeling need. New, easy-to-use window tray package contains continuous strip of 500 labels which are guaranteed not to curl or stick together. Choice of ten colors. Free folder sent on request.

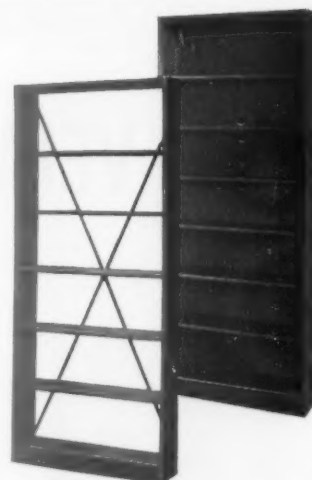
### ROTARY VISIBLE REFERENCE STAND

Holds 50 double-faced frames, either 12 $\frac{5}{8}$ " high, or 20 $\frac{5}{8}$ " high, rotating on ball-bearing stand. 12 $\frac{5}{8}$ " frames give easy access to 3,300 2-line, or 6,000 1-line references. 20 $\frac{5}{8}$ " frames provide 5,500 2-line, or 10,000 1-line references. Visible width of records, in both sizes, 5", 6", and 8". Frames easily removed and replaced—a fast, economical, compact system.



### STEEL BOOK SHELF UNITS —SLOTTED TYPE

Closed or open back. (Open back rigidly braced.) 2 Sizes—84" and 90" high overall. Shelf space 34" wide, 9" deep. 6 Shelves, adjustable every inch. Available in green or gray finish.



### DOUBLE-DOOR STEEL STORAGE CABINET

2 Sizes. Outside dimensions—78" high; 36" wide; 18" deep. 78" high; 36" wide; 24" deep. Seal gray or green finish. Doors have reinforced panel. Strong 3-point locking device assures protection. Four shelves furnished; easily adjusted at  $\frac{1}{2}$ -inch intervals.



### FAMOUS STEEL SECTIONAL BOOKCASES

G-W 4800 Line. Outside dimensions of sections 33" wide, 10 $\frac{3}{4}$ " deep, three heights—12", 14", 16". Seal gray or green finish. Light-weight, easy to re-arrange. Add sections to meet individual requirements. Receding type glass doors protect contents.



See your local dealer or write  
THE GLOBE-WERNICKE CO., Cincinnati 12, Ohio

# ALL-STEEL EQUIPMENT INC.

41 Griffith Avenue, Aurora, Illinois

## THE VERY FINEST MODERN EQUIPMENT ... at the right prices!



Several complete grades of filing equipment. Shown above 5401, four drawer letter.

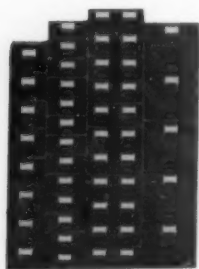


Here's the much discussed A·S·E Aurora 6000 Line Desk. Shown here—the 60 x 30 Flat-Top Desk. The line is unexcelled for convertibility.

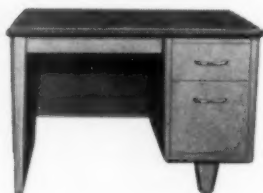


Over 36 sizes and styles of Storage, Combination and Wardrobe Cabinets. 3485 Combination Cabinet shown above.

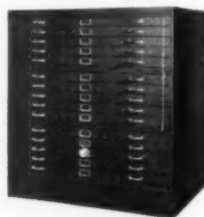
The one thing we like best for people to do is compare All-Steel equipment with any on the market. Our way of building equipment is to start putting quality into it at the design stage and continue to do so all through its manufacture. We, too, study competitive merchandise. We equal the best of any features we find, we better them wherever we can. For we are determined that A·S·E shall continue to be the top quality line. But—here's the important thing to remember: our manufacturing methods make it possible for us to produce that top quality at prices often no more than those of less desirable products. It will pay you to compare.



A·S·E Dead Storage Files are equipped with easy sliding drawers—can be stacked high to save space. Improved side-locking devices prevent slipping or tipping.



A·S·E 6000 Line Single Pedestal desk, 45" x 30". Ideal for classroom use.



Complete line of blueprint cabinets—a size for all standard size drawings.



A·S·E Unit-Robes accommodate maximum storage in limited floor space. 9010 shown here, accommodates 16 persons.



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**DEALERS IN**  
ALL PRINCIPAL  
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A modernized and complete line of steel desks, tables, chairs and filing cabinets, designed and built for office and institutional requirements.

## CHAIRS

Chairs for the office, for the class, assembly or reception room, with or without arms. Available in 18 styles, 9 finishes, various upholstery materials, and a full range of colors in each.



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Six different styles and sizes, each designed to meet a specific seating requirement. Styling and durability, proper posture and economy, these are features providing "engineered comfort."

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These glass door bookcase sections are substantially constructed units, carefully designed and built. Doors are of disappearing type, dust-proof with equalizing device. Three heights, with top and base, intermember perfectly, permitting easy expansion.



## MULTIPLE-15 DESKS AND TABLES

This new principle "Multiple-15" revolutionizes space planning. Engineered in 15" multiples, it offers a top combination of economy, efficiency and smart styling. Flexible because scientific standardization of parts provides interchangeability. There is a desk to meet the requirements of every office job. Completely functional and beautifully proportioned, these desks and tables will add impressive distinction to the office.

## FILING CABINETS

Steelcase Stylefiles contribute to the smart appeal of the office, as well as to its filing efficiency. Easy, noiseless action and positive closing answer a long-felt need in drawer operation.

2-, 3-, 4-, 5-drawer heights

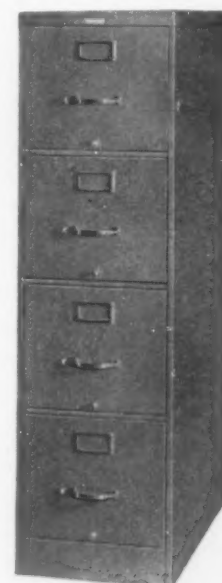
Wide range of styles

Drawers roll on balls

Finger-tip action

"Torque plate" rigidity

A lifetime of service



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# THE MOSLER SAFE CO.

320 Fifth Avenue, New York 1, N. Y.

## are you being fair

## to

## your students?



### Economical, Easy-to-Install Vault Door

Combine the all-round convenience of a record vault, with the safety of a Mosler Non-Grout Door. Saves money on installation. No cementing! No patching! No "after job" mess. Can be installed in fraction of usual time. Carries the Underwriters' Laboratories label, providing up to 6 hours fire protection. Available in both single and double door arrangements.

Loss of scholastic records—by fire or burglary—could jeopardize your students' entire educational future, and seriously harm your school's reputation.

Don't run *that* risk! Play safe, by installing Mosler fire and burglary resistive equipment—the finest in modern record protection, by the largest builders of safes and vaults in the world.

For valuable, detailed information on any Mosler unit below, write us today. We will be glad to recommend the best protective equipment to fit your particular needs.



### Modern Fire-Resistive Safe

For on-the-spot protection of vital records—it's a modern Mosler safe. Tested for one-to-four hour fire exposure, plus impact and drop tests. Available in a variety of sizes and interiors. Burglary premiums can be reduced as much as 70%, when a money chest is used to safeguard cash-on-hand.



### Convenient Fire-Resistive File

Keep records handy, yet safe from fire . . . in Mosler Insulated Record Containers. They are made with receding doors, controlled by keys, combination locks, or both. Available in letter or legal width drawers, and 2, 3 and 4 drawer heights. Used singly or in batteries, with linoleum tops, they form convenient working counters.

For further information on Mosler Safes, Vaults and Insulated Record Containers write Dept. SU

## The Mosler Safe Co.

Main Office: 320 Fifth Ave., New York 1, N. Y.

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Factories: Hamilton, Ohio

Largest Builders of Safes and Vaults in the World



Builders of the U. S. Gold Storage Vault Doors at Fort Knox, Ky.

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## IMPROVED SPECIMEN STORAGE WITH LANE STEEL CABINETS

### SKIN CASES

for Ornithological & Zoological Specimens

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for Cornell & U.S.N.M. Type Drawers

### PALEONTOLOGY and

### GEOLOGY CASES

#### Featuring:

**Heavy Gauge Steel**

**All-Welded Construction**

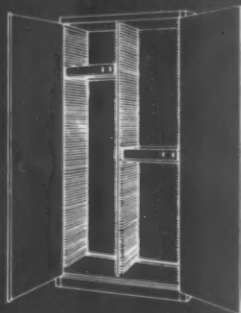
**Air-Tight, Insect-Proof**

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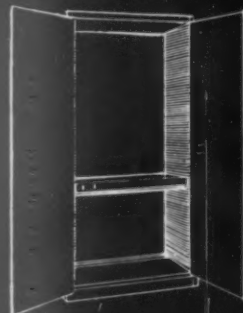
**Furniture Finishes**

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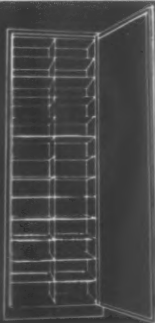
**Immediate Delivery**



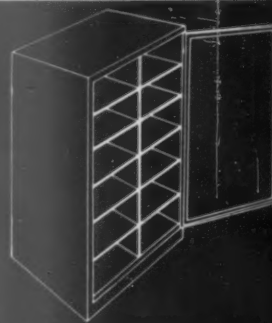
Skin Case for small specimens



Skin Case for large specimens



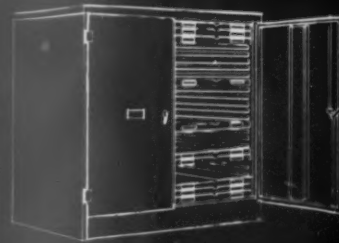
Herbarium Case



"Junior" Herbarium Case



Entomological Cabinet



Paleontology & Geology Case

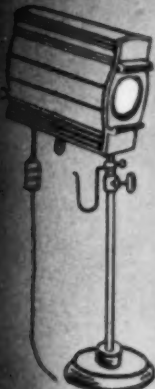

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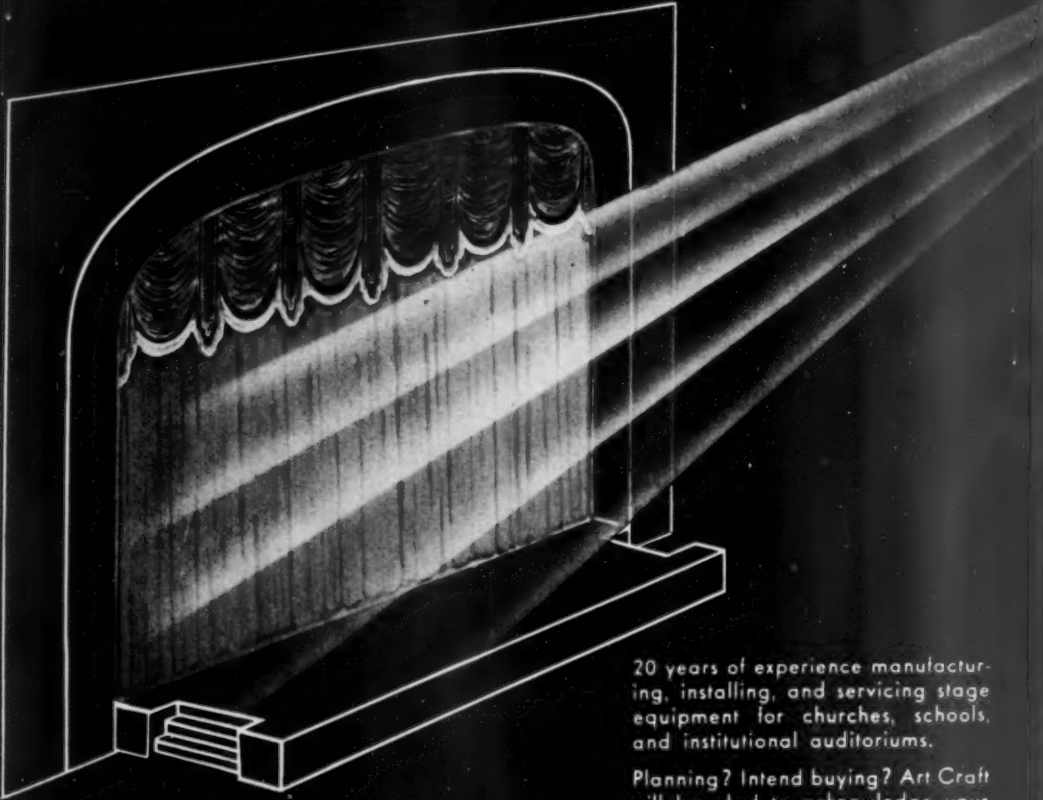
# ART CRAFT THEATRE EQUIPMENT CO.

108 West 46th Street • New York 19, N. Y.

## Complete STAGE EQUIPMENT

- cycloramas
- lighting equipment
- stage hardware
- scenery
- window draperies
- dimmers
- asbestos curtains
- stage rigging
- stage curtains
- steel tracks
- motor controls
- velour rope railing






20 years of experience manufacturing, installing, and servicing stage equipment for churches, schools, and institutional auditoriums.


Planning? Intend buying? Art Craft will be glad to acknowledge your inquiries promptly.

### REQUIREMENTS FOR QUOTATIONS

1. Width and height of proscenium
2. Height from stage floor to ceiling.
3. Depth of stage.
4. Width on stage.

Upon receipt of measurements, samples and price will be mailed upon request. For descriptive literature, specify circular No. 303



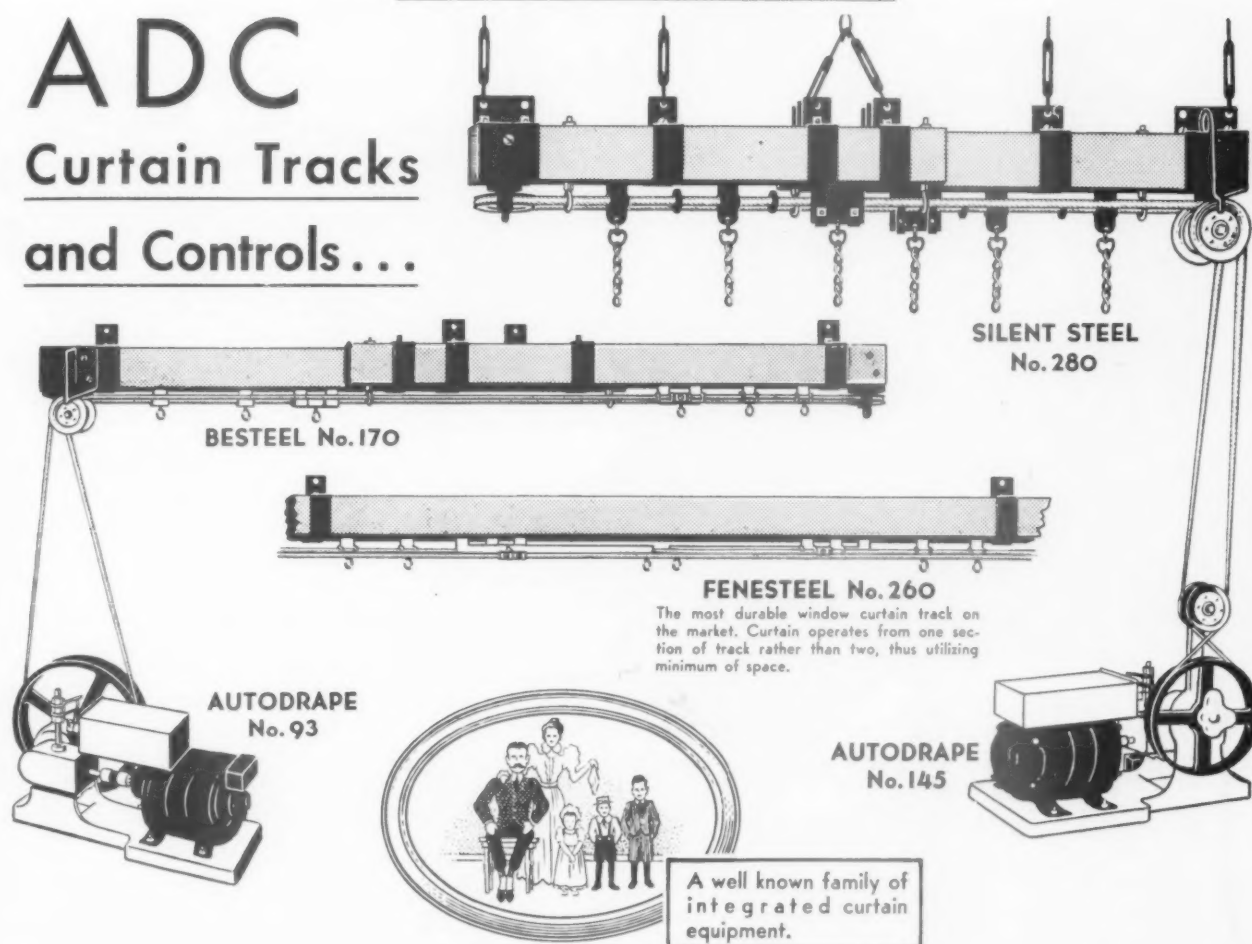
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# AUTOMATIC DEVICES COMPANY

116 N. 8th Street, Allentown, Pennsylvania

## ADC Curtain Tracks and Controls...



### GUIDE FOR PURCHASERS

TRADE NAME	DESCRIPTION	RECOMMENDATIONS
<b>BESTEEL</b>	Medium duty steel fireproof curtain track for light and medium weight curtains. Carriers roll on two separate parallel treads.	For lengths up to 36 feet.
<i>Fenesteel</i>	Window curtain track — steel and fireproof. Features self-lapping master carrier which eliminates overlap. Installed single in one section. Carriers roll on two separate treads.	For lengths up to 36 feet.
<b>SILENT STEEL</b>	Heavy duty steel fireproof curtain track for heavy weight curtains. Ball bearing carriers roll on two separate parallel treads.	For all lengths.
<b>autodrape</b>	SPECIAL MODEL (No. 93) has 1/4 HP motor, 60 cycles, 110 volts, single phase (available in other voltages, cycles or currents). STANDARD MODEL (No. 145) has 1/3 HP motor, 60 cycles, 110 volts, single phase (available in other voltages, cycles, or currents).	With all ADC tracks up to 36 ft. With Silent Steel tracks up to 50 ft.
<b>SILVER SERVICE</b>	Has 1/2 HP motor, 60 cycles, 220 volts, single phase (available in other voltages, cycles, or currents).	With Silent Steel tracks up to 80 ft.
<b>STAND STEEL</b>	22-inch high control stand designed for easier operation of curtain machine. Eliminates dirt and safety hazard normally prevalent when machine is on floor.	For Autodrape machines.

HOW TO ORDER TRACK: Assume proscenium opening of 20', height from ceiling to floor 12'. Add 10% for lap at center for curtain when closed. Add 10% for extension for packing of curtain when open, total 30%. Specify: 1-26' No. 170 track in two sections each 13 feet for hand (or machine) operation 12 feet high.

# CAPITOL STAGE LIGHTING CO., INC.

527-529 West 45th Street, New York 19, N. Y.

*"The Answer to Your Spotlight Problem"*

## — THE CAPITOL No. 901 Spotlight

This Spotlight affords illumination that is clear, white and without flicker or noise. It can easily be focused from an 18" head spot at 100 feet to flood a full stage with even light at the same distance. Yet it uses only a 1000 or 1500-watt T-20 pre-focus-base long-life lamp, obtainable anywhere. It is the **ONLY** Mazda Spotlight with all these features:



PRICE, COMPLETE  
AS SPECIFIED —  
\$250.00

This unit is all new, both in design and type of lens system used. It is the only unit sold completely equipped with all the controls, shutters, lenses, colorbox, etc., needed for its operation.

- 1** 1000 or 1500 watt prefocus projector type bulb with double lens optical system for maximum brightness.
- 2** Truly round spot of even illumination formed by a precision Iris shutter.
- 3** Handle for following also instantly adjusts size of spot from head spot to flood.
- 4** Lever for masking top and bottom of light for special effects or when floodlighting.
- 5** Six independent colors, finger-tip controlled, making possible other colors by combining two or more.
- 6** Built-in finger-tip controlled dower for fadeouts — controlling brightness.
- 7** Convenient built-in double pole switch.
- 8** Designed for ease of operation and simplicity of control.

*— Distributed by your Local Dealer*

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Peabody Auditorium  
Daytona Beach  
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MacDonough & Craig and  
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Architects

Knoxville Scenic Studios  
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Installation



## Standard CLANCY EQUIPMENT

Television Studio Equipment  
Asbestos Curtains  
Clancy Contour Curtains  
Olio and Painted Drops  
Cycloramas  
Auditorium Drapes  
Interior Flats  
Curtain Tracks & Controls  
Console & Orchestra Lifts  
Wagon & Revolving Stages  
Picture Screens  
Counterweight Equipment  
Lighting Equipment  
Bull Wheels  
Magnascopes  
Electric Winches  
Motor Controls  
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Flying Microphones  
Disappearing Microphones

COMPLETE LINE OF  
STAGE HARDWARE

## From Basic Plan to Finished Stage — ONE CONTRACT • ONE CONTRACTOR ONE COMPLETE GUARANTEED SERVICE

To insure compactness, flexibility and safety of your stage, take advantage of Clancy's *complete* service — from basic design to finished stage. One contract — one contractor — one complete service — and a guarantee covering the entire operation.

Regardless of the size, type or design of your stage — for whatever purpose — Clancy can furnish complete rigging from standard catalog items produced on a production basis by modern production methods — a fact that means better equipment at lower costs. Every step in production is carefully controlled — even to having materials checked by consulting metallurgists as extra assurance of complete strength and safety. All plans are made by licensed engineers.

You can profit by the skill and experience that have made Clancy the world's largest designers, manufacturers and riggers of stage equipment. And you profit most if you call on Clancy *before* you start your plans for a new or remodeled stage.

*World's Largest Designers, Manufacturers and Riggers of Stage Equipment*

No Job  
Too Large

Established 1885



No Job  
Too Small

World-Wide Service

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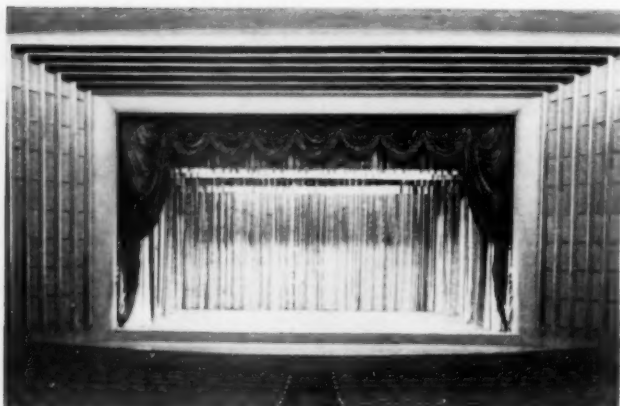
# R. L. GROSH & SONS SCENIC STUDIOS

*Designers • Manufacturers • Consultants*

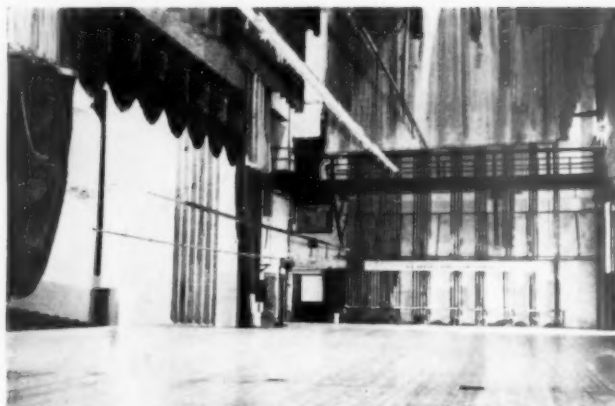
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FULL STAGE DRAPERY SETTING



VIEW BACKSTAGE



## SPECIAL ATTENTION TO SCHOOL ARCHITECTS AND SCHOOL EXECUTIVES

Our designing department will submit layouts, plans and specifications with samples, color suggestions and estimates in planning new School Auditoriums, Cafeteriums, Multi-Purpose Rooms and Gymnasium Stages; also for remodeling outdated auditorium stage equipment.

Our employees are fully experienced in the execution of various types of stagecraft. Our modern facilities allow us to manufacture any type of stage equipment that may be desired. You are cordially invited to inspect our studio on your next visit to Southern California.

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INN SCENE from the "STUDENT PRINCE"



### COMPLETE EQUIPMENT

Asbestos Curtains, Front  
Curtains, Drapery Settings,  
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Scenery, Slote Tracks,  
Picture Screens

### STAGE ACCESSORIES

Spot Lights, Flood  
Lights, Stage Hardware,  
Flameproofing, Darkening  
Curtains, Paint Supplies,  
Scenic Canvas

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Originators and  
Manufacturers of  
"KLIEGLIGHTS"

## KLIEGL BROS.

UNIVERSAL ELECTRIC STAGE LIGHTING CO., INC.

*Theatrical Lighting*

321 West 50th Street,  
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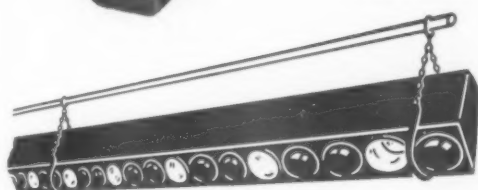
Selected showing of typical stage lighting devices we manufacture for use in schools and colleges. Our complete line includes equipment of every description for stage, auditorium and general illumination. Leading specialist in the field for more than half a century, years of experience are reflected in the design and quality of our products. Proper fulfillment of your requirements is assured by a competent staff.

### FRESNEL SPOTLIGHT, No. 43N8-E



Unsurpassed for highlighting applications, produces a circular spot or flood beam of light with even field of illumination and soft diffused outline. Fully equipped with heat resisting Fresnel lens; movable lamp carriage for focusing; Alzak reflector to intensify light beam; slide grooves for color frames; and swivel mounts for universal directional movements. Model No. 43N8-E takes a 1000 watt lamp and has 8" diameter lens. Price \$54.00. Smaller and larger sizes available, also various mounting arrangements.

### BORDERLIGHT, No. 610

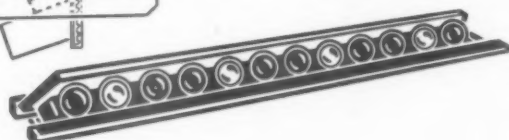
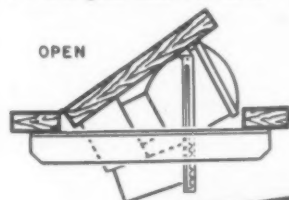


Most popular form for general illumination of the stage from hanging pipe battens. Provides both white and color lighting. Gives maximum light output, correct distribution and pure color values. Has individual Alzak aluminum reflectors with glass color roundels in hinged-ring holders. Wired for independent control of colors. Complete with scenery guards and chain hangers. Model No. 610, takes 75 or 100 watt lamps, 6" on centers. Furnished any length desired. Larger sizes and other types also available.



### DISAPPEARING FOOTLIGHT, No. 832

Particularly suitable for school stage . . . when not in use may be closed flush with stage floor leaving platform unobstructed for speakers or other purposes. Provides upward illumination to subdue shadows cast by overhead lights. Highly efficient, with individual Alzak reflectors and glass color roundels. Wired for independent control of three colors. Furnished in standard five foot unit lengths, with automatic cut-off switches. Model No. 832 takes 75 or 100 watt lamps. Price \$80.00 per section. Other types and sizes available.



### KLIEGLIGHT, No. 1365-E



Very serviceable for effect lighting, wherein brilliant illumination of a particular area with a well-defined cut-off is required. Projects a spot or flood beam of light which may be patterned to desired shape by adjustment of inbuilt four-way framing shutters. Used on stage from overhead or side entrances, and in auditoriums from balcony rail or other locations for stage-front lighting. Has ellipsoidal Alzak reflector with co-ordinated lens system in adjustable holder for sharp or soft focusing. Model No. 1365-E, has 6" diameter lens and takes 250 or 500 watt lamp. Price \$39.00. Other sizes, types and arrangements available.

### SUPER-KLIEGLIGHT, No. 1174

Excellent general service long range unit for spot or flood-lighting. Ideal for use from projection booth or balcony, as follow-spot on individuals or to floodlight entire stage. Has inbuilt iris and curtain shutters for regulating size and shape of light beam. Its incandescent light source permits dimming. All provisions have been made for utmost flexibility and mobility. Controls are simplified and conveniently located at rear of housing. Heat-resisting 12" lens in movable carrier permits sharp or soft focusing of cut-off. Ellipsoidal Alzak reflector and prefocused lamp holder insure maximum light output. Air-cooled by motor-driven blower. Swivel mountings allow unrestricted freedom in directional movements. Easy-rolling ball bearings facilitate transpositions. Telescopic pedestal allows for height adjustments. Model No. 1174 takes 2000 watt lamp. Price \$245.00. For exceptionally long-range requirements, 3000 watt Dyna-beam is available.



### CATALOG No. 54

Information on all kinds of equipment and devices for lighting stage productions is embodied in our Catalog No. 54. Ninety pages of clarifying illustrations, detailed explanations and technical data, completely indexed, makes it a valuable reference book for anyone interested in this specialized field of lighting. If you are without a copy, it will be forwarded promptly on request.



### INQUIRIES INVITED

Telephone, write or visit our office whenever in need of our assistance. Helpful suggestions will be offered in the selection of equipment or for planning installations, and practical solutions of lighting problems will be recommended.

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## *Distinctive* Stage Equipment

DESIGNERS . . . . .  
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Asbestos Curtains & Rigging  
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Picture Screens & Frames  
Stage Hardware  
Cycloramas—Wall Covering  
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Peabody Auditorium, Daytona Beach, Florida

### EXPERIENCE

Our long experience in the design and creation of distinctive Stage Equipment enables us to offer the architect or the owners in the developing of plans, a service of the highest professional type.

Our service includes preparation of blueprints, showing details of gridiron construction, smoke pockets, position and operation of all curtains, cycloramas, side drapes, border lights and light bridges, sound horns, picture screens, revolving stages, stage, console or orchestra lifts.

### INSTALLING

The erection and installation of our equipment and rigging is personally supervised by our own installation specialists, schooled by many years of experience in all types of stage rigging, wall covering and decorating jobs for colleges, schools, civic auditoriums, theatres, institutions and night clubs. This insures the proper technical hanging of all equipment for satisfactory service.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

### ASBESTOS CURTAINS

Fire curtains for all types of prosceniums, including rigid or steel frames, Braille Type where no height above proscenium is available, Trip Type and Roll Curtains. All equipped with automatic release lines to permit immediate descending under own weight. Equipped with motor driven hoists or for manual operation.

### PARTIAL LIST OF INSTALLATIONS

Texas State College for Women	
Indiana University	Valparaiso University
Northern Illinois State Teachers College	
University of Chicago	University of Georgia
Murfreesboro State Teachers College	
Memphis State College	Carson Newman College
Johnson City State Teachers College	
A & I College	William & Mary College
Southern Illinois Normal University	
Louisiana State University	



# HUBERT MITCHELL INDUSTRIES

Manufacturers of Complete Stage Equipment

Hartselle, Alabama



## Prolog

Hubert Mitchell Industries PRESENTS a complete line of stage equipment—with an enviable reputation built up over a period of twenty years for fair prices, quality products and speed of delivery to any point in the United States.

### I. Curtains and Drapes

Before the curtain rises, the audience's first impression is the curtain itself. Therefore we exercise the utmost care in producing the highest quality drapery for school stages, designed in good taste. A wide variety of designs, colors and fabrics is available, at reasonable cost.

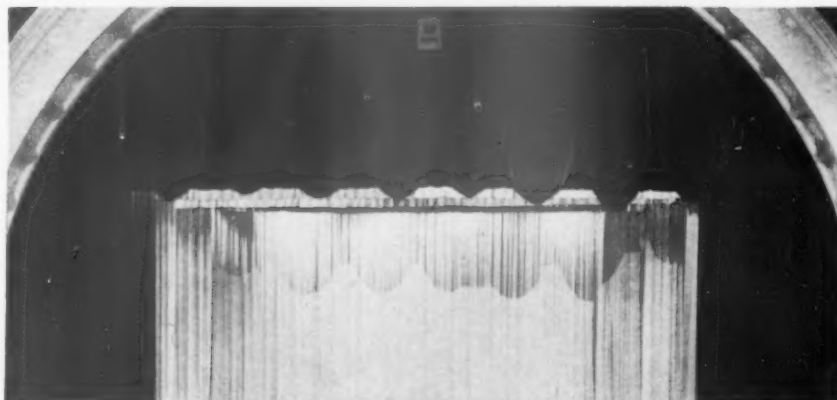
Also, since every modern school needs one or more completely darkened rooms for visual education, we supply a wide variety of window drapes for classrooms and auditoriums.

ACT I — CURTAINS AND DRAPES

ACT II — SCENERY AND PROPS

ACT III — STAGE LIGHTING

ACT IV — STAGE HARDWARE



### II. Scenery and Props

As the curtain rises, the stage setting—good, bad or ridiculous—helps set the mood of the audience. Hubert Mitchell Industries offers your school a wide selection of attractive scenery pieces and props, including exterior and interior backdrops, doors, windows, steps, tree trunks, urns, etc. In selecting equipment to fit your particular requirements, our consultants will be glad to assist.



Paneled Door



Urn



Tree Trunk



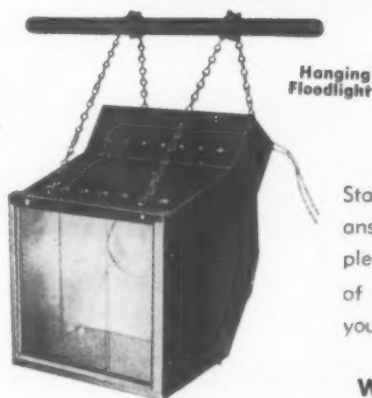
Newel Post

### IV. Stage Hardware

To help each stage performance to run smoothly, with minimum time and effort required for curtain-raising and lowerings and scenery shifts, Hubert Mitchell Industries supplies stage hardware and curtain tracks that have been proved dependable during its more than twenty years of service.

### III. Stage Lighting

Lights bring the school stage to life! Hubert Mitchell Industries offers a wide selection of lighting equipment for school stages from Baby Spots to Giant Floodlights. If the school budget does not allow the purchase of a complete set of lighting equipment at one time, we will gladly help in planning the order of your purchases to give best possible stage lighting in the interim.



Hanging Floodlight

## Epilog

Stage requirements invariably present individual problems. For the answers to your particular stage equipment and scenery problems, please contact us or our representative in your section. The services of our experienced personnel can be of great aid to you in planning your requirements so as to receive the most from your budget.

Write for complete booklet: Hubert Mitchell Industries

# MORK-GREEN STUDIOS, INC.

*Producers of*  
Complete Stage Equipment

243 W. Congress Street  
DETROIT 26, MICHIGAN

40 Wood Building  
SYRACUSE 2, NEW YORK



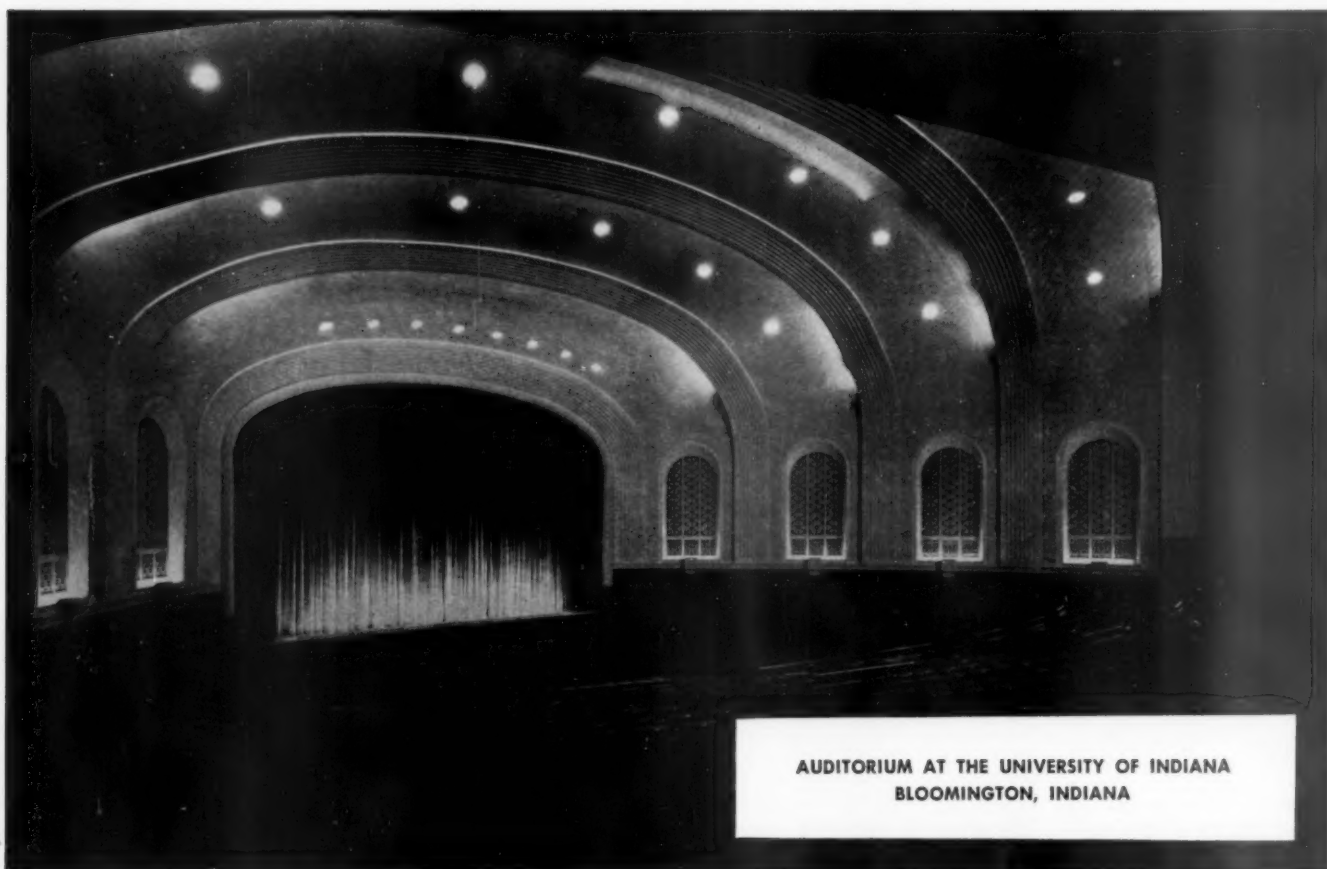
THROUGH our most modern facilities and experienced personnel, we are able to offer the highest type of quality Stage Equipment.

We are proud of our reputation as designers and creators of the finest in our line.

**Write us. Our representative will be glad to call, at no obligation on your part.**



VELOUR CURTAINS  
CURTAIN TRACKS  
CURTAIN CONTROLS  
CYCLORAMAS  
PAINTED SETTINGS  
WINDOW DRAPERIES  
ELECTRICAL EQUIPMENT  
ASBESTOS CURTAINS  
COUNTERWEIGHT RIGGING  
STAGE HARDWARE  
PICTURE SCREENS  
THORTEL FIBERGLAS FABRICS



AUDITORIUM AT THE UNIVERSITY OF INDIANA  
BLOOMINGTON, INDIANA

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# NORTHWEST STUDIOS INC.

607 Marshall St. N.E., Minneapolis 13, Minn.

Bridgeport 3320



**For the best in complete theatrical equipment, consult NORTHWEST**

## Suppliers of:

velour curtains  
cycloramas  
counterweight systems  
tracks of all types  
picture screens  
darkening curtains  
painted drops and settings  
velour portals

## Lighting equipment sold or rented:

portable dimmer boards  
stage cable  
leco spotlights  
stage plugs of all types  
color frames and color wheels  
gelatin and dry colors  
x-ray border lights  
flood lights  
spotlights of all types

When planning for a new auditorium or refurbishing existing stage facilities, Northwest is your logical choice. Planning beforehand rather than improvising later is of the utmost importance in acquiring highest quality appearance and truly functional design. Northwest's experienced craftsmanship assures you of an expert installation yet costs you no more. Inquiries are respectfully requested and will receive prompt attention.



*Complete installation of all equipment*

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



# NOVELTY SCENIC STUDIOS, INC.

32-34 West 60th Street

New York 23, N. Y.

**CREATING SMART INTERIORS**  
in Schools • Colleges • Institutions  
for 30 Years

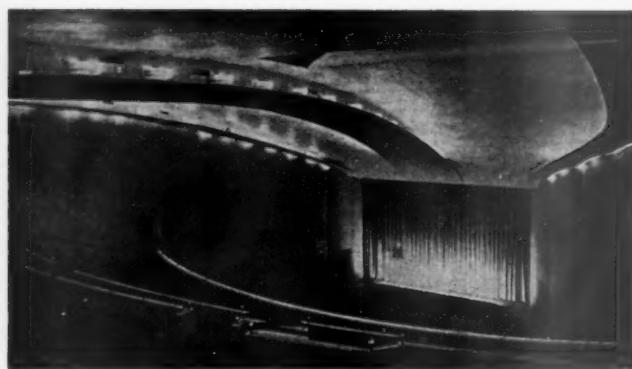
IT MAKES A WORLD OF DIFFERENCE

*Who Decorates!*

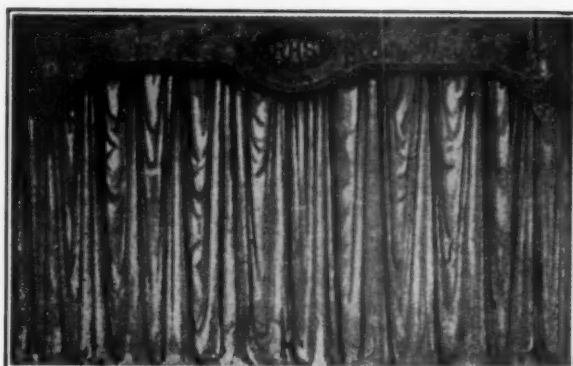
In Novelty Scenic Studios you have one of America's largest fabricators of curtains and draperies for stage, auditorium and other public areas. Here, all phases of draperies and interior decoration are created by design artists and executed by skilled craftsmen.

Let our experts recommend a professional and economical layout for your school stage or auditorium windows.

Whether your requirements are large or small, you will find our organization attuned to render maximum service.



Draperies  
Stage Rigging  
Curtain Tracks  
Lighting  
Asbestos Curtains  
Stage Curtains  
Scenery



## Requirements for Estimates

Proscenium { Width  
Opening { Height

Depth of Stage to  
Back of Wall

Height from Pro-  
scenium Opening  
to Stage, Ceiling,  
or Gridiron

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

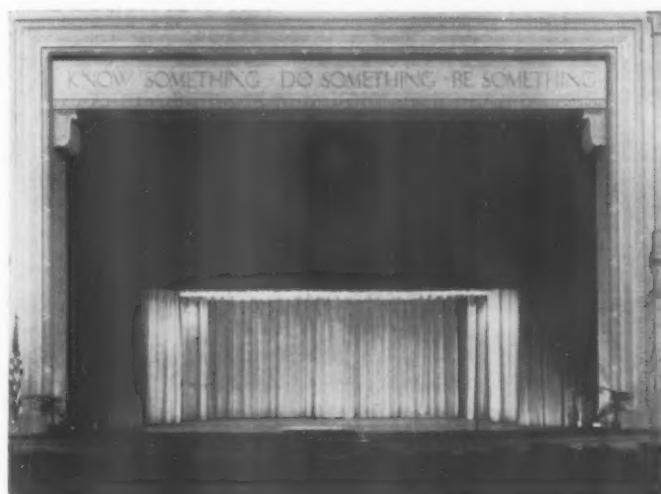
# PITTSBURGH STAGE & EQUIPMENT STUDIOS

Manufacturers and Distributors of Complete Stage Equipment

3701 Charlotte St.

MAYFLOWER 1-2114

Pittsburgh 1, Pa.



Taylor Allderdice High School, Pittsburgh, Pa.

*Have a Versatile Stage Setting! By means of our Curved Cyclorama Track your large Stage can be converted to a smaller unit for one-act plays—or can be cleared for use as gymnasium where necessary. Changed with ease and in a matter of minutes!*

VELOUR CURTAINS  
CONTOUR CURTAINS  
AUDITORIUM DRAPERIES  
ASBESTOS CURTAINS

INTERIOR FLATS  
WOODLAND DROPS  
SKY DROPS  
CURVED CYCLORAMA TRACK

SPOT LIGHTS  
BORDER LIGHTS  
STAGE RIGGING  
STAGE HARDWARE

*Repairing, Drycleaning and Flameproofing Service  
Flameproofing Guaranteed to Meet State Underwriters Specifications*

## A Few of Our Recent Installations

Nazareth Academy—Rochester, N. Y.  
State Teachers College—Fredonia, N. Y.  
Schwab Auditorium—State College, Pa.  
Western High School—Washington, D. C.  
Seton High School—Baltimore, Md.  
St. Joseph's College—Emmitsburg, Md.  
John Marshall School—Wausau, Wis.  
Herscher Twp. High—Herscher, Ill.  
Indiana University—Bloomington, Ind.  
Fairmont High School—Fairmont, W. Va.  
Lumberport High—Lumberport, W. Va.  
Patrick Henry Jr. High—Cleveland, Ohio  
Alliance High School—Alliance, Ohio  
Warren G. Harding High—Warren, Ohio  
Board of Education—Pittsburgh, Pa.  
Board of Education—Cleveland, Ohio



South High School, Pittsburgh, Pa.

*Pittsburgh Stage and Equipment Studios*

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# TWIN CITY SCENIC COMPANY

2819-21 Nicollet Ave., Minneapolis 8, Minn.

**For 52 Years TWIN CITY SCENIC COMPANY has specialized in the complete Creation of all types of School Stage Equipment**



## **FACILITIES . . .**

Our engineering department will be glad to give you complete layout and prices on your present needs. When planning your new schools, send us your plans and we will be pleased to cooperate with you and your architect in preparing an up-to-date stage.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

**PROSCENIUM CURTAINS and TRACKS**  
**PAINTED SCENERY**  
**CYCLORAMA CURTAINS and RIGGING**



**WE SPECIALIZE IN STAGE AND WINDOW DRAPERIES FOR SCHOOL USE. WRITE ABOVE ADDRESS.**



# VOLLAND STUDIOS

(ESTABLISHED 1869)

600 Delmonte Way  
St. Louis 12, Mo.

"There is scarcely anything in this world  
that some man cannot make a little  
worse, sell a little cheaper, and the buyers  
who consider price only are this man's  
lawful prey."

. . . . Ruskin

*If  
It is Used  
On a Stage  
We Can Furnish It*

Front Curtains and Valances

Steel Tracks

Cyclorama Settings

Painted Scenery

Borderlights and Footlights

Window Draperies

Flameproofing

Present Equipment Chemically Cleaned

*Write Us for Samples, Drawings, Specifications and Prices*

# THE INTERNATIONAL SILVER COMPANY

Hotel Division • Meriden, Conn.



**Let me help  
you choose the  
flatware you need!**

No one is better qualified to help you choose new flatware than your **INTERNATIONAL SILVER COMPANY CERTIFIED DEALER**. Phone him, today. And, remember, the International Silver Company makes a quality flatware for *every* need!

Shown here, are a few of the many patterns and qualities now available.

INTERNATIONAL SILVER CO.

## EXTRA HEAVY HOTEL PLATE

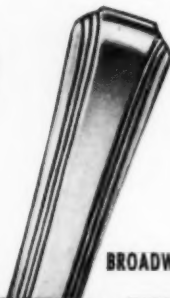
This is the very finest hotel silverplate, in design, weight, thickness of plate and finish. It is the silverplate chosen by many of America's foremost hotels.



CROMWELL



SUSSEX



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Better restaurants pick this finer silverplate. It is quality throughout—giving you finer finish, finer appearance and longer use, thanks to many unusual construction features.



COPLEY



AMERICAN



DEARBORN

VICTOR S. CO. A3 • OVERLAY IS

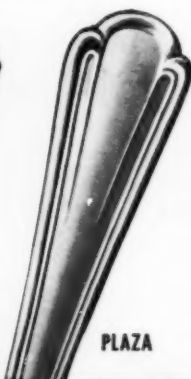
The outstanding silverplate value for busy restaurants. This fine silverplate combines eight quality features with low cost.



ASTOR



SAVOY



PLAZA

SILCO STAINLESS U.S.A. 15-3

## 1 REPUBLIC PATTERN

**Bright Finish.** The ideal, low-cost medium weight stainless for diners, fountains, cafeterias. Has many quality features usually found only in higher-priced lines.

## 2 EMPIRE PATTERN

**Mirror Finish.** The finest stainless you can buy. Heavy weight, with all surfaces and edges highly polished. Beautiful, durable . . . preferred by many schools, institutions and restaurants.



1



2

# THE INTERNATIONAL SILVER COMPANY

HOTEL DIVISION, MERIDEN, CONN.

**QUALITY SILVERWARE** for

HOTELS • RESTAURANTS • HOSPITALS • COLLEGES • SCHOOLS

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



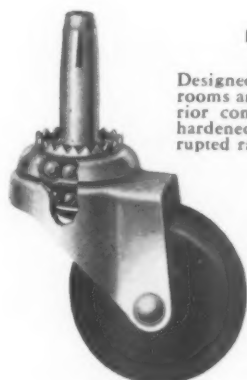
# FAULTLESS CASTER CORPORATION

DEPT. SU-50-51

REPRESENTATIVES IN PRINCIPAL CITIES

Evansville, Indiana

CANADIAN FACTORY: STRATFORD, ONTARIO



## FAULTLESS DOUBLE BALL BEARING CHAIR CASTERS

Designed especially for use on chairs in offices, study rooms and libraries, where quiet is essential. Of superior construction, this caster has two full rows of hardened ball bearings swiveling freely in uninterrupted raceways. Low over-all height, dust-proof construction. Bearings lubricated at factory. Furnished with either Ruberex (cushion tread) or Plaskite (hard tread) wheel. A very easy swiveling caster.

### Copper Oxidized Finish

Style No.	Kind of Wheel	Diam. of Wheel	Wt. Per Set of 4
2478	Ruberex	1 1/2"	1 Lb. 6 Oz.
2479	Ruberex	2"	1 Lb. 10 Oz.
2378	Plaskite	1 1/2"	1 Lb. 4 Oz.
2379	Plaskite	2"	1 Lb. 10 Oz.

Packed one set in a box.



Faultless Light Duty Truck Caster has two complete ball races, using best grade balls, all bearing surfaces hardened, special king pin construction, dust-proof. Furnished with Roller Bearing Ruberex or Plaskite wheels. A very strong, durable caster.

Style No.	Kind of Wheel	Diam. of Wheel	Size Plate	Lbs. Cap. Each
1123-3	Ruberex	3"	4 x 4	200
1123-4	Ruberex	4"	4 x 4	250
1131-3	Plaskite	3"	4 x 4	300
1131-4	Plaskite	4"	4 x 4	350

Rubber Tired Wheels available

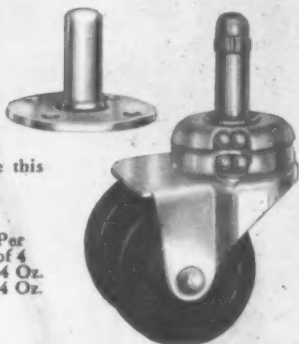
## FAULTLESS DOUBLE WHEEL PIANO CASTER

This double wheel, double ball bearing, noiseless Piano Caster has two rows of ball bearings operating in lubricated hardened raceways. Used with No. 98 socket. Wood Ferrule for use over socket for large drilled hole. Supplied with a plate, where this type is needed.

### Copper Oxidized Finish

Style No.	Diam. of Wheel	Kind of Wheel	Wt. Per Set of 4
HW479-2	2"	Ruberex	2 Lbs. 4 Oz.
HW379-2	2"	Plaskite	2 Lbs. 4 Oz.

Size Bore 5/8" x 1 1/4".  
Packed one set in a box.



This Faultless Rigid Truck Caster is a desirable companion to the 1100-Series. Made of extra heavy gauge steel. The 1700-Series Rigid and 1100-Series Swivel Casters have the same mounting hole positions and same over-all height, for interchangeability and quick replacement.

Style No.	Kind of Wheel	Diam. of Wheel	Size Plate	Lbs. Cap. Each
1723-3	Ruberex	3" 3 13/16"	3 13/16 x 3 13/16	200
1723-4	Ruberex	4" 3 13/16"	3 13/16 x 3 13/16	250
1731-3	Plaskite	3" 3 13/16"	3 13/16 x 3 13/16	300
1731-4	Plaskite	4" 3 13/16"	3 13/16 x 3 13/16	350



## FAULTLESS DESK CUPS

Faultless Ruberex or Rockite Desk Cups are of nonbreakable, rust-proof composition, in a harmonizing brown shade.

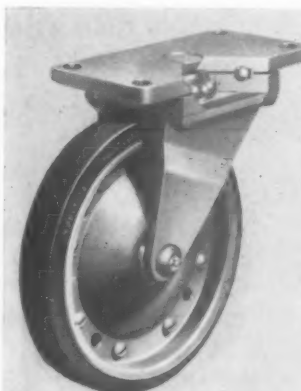
### Round Shape Desk Cups

Style No.	Diam.	Wt. Per Set of 4
RDC	1 1/2"	5 Oz.
RDC	1 3/8"	7 Oz.

### Square Shape Desk Cups

Style No.	Diam.	Wt. Per Set of 4
SDC	1 1/2"	6 Oz.
SDC	1 3/8"	7 Oz.
SDC	2"	13 Oz.
SDC	2 3/8"	15 Oz.

Packed one set in a box.



## FAULTLESS DOUBLE BALL BEARING MEDIUM DUTY TRUCK CASTER

This Faultless Ball Bearing Swivel Caster is a companion caster to the 700-Series Caster. Furnished with Rubber Tired, Roller Bearing Wheel.

Style No.	Diam. of Wheel	Size Plate	Lbs. Cap. Each
3317-5	5"	4" x 7"	400
3317-8	8"	4" x 7"	500

## FAULTLESS CUSHION CHAIR GLIDES

Faultless quiet Cushion Chair Glides are mounted in live rubber. Steel reinforcing frame prevents nail pulling out. Base is of hardened steel, copper oxidized, impervious to wear. Furnished with Spring Clip Socket for square or round tubing, 3/8", 1" and 1 1/8". Approx. wt. per box, 5 oz.

### Flexible Cushion Chair Glide

Style No.	Diameter of Base
NRS	3/8"
NRS	1 1/8"
NRS	1 1/4"

Packed one set in a box.

### Cushion Chair Glide Spring Clip Socket

Style No.	Diameter of Base
ORS	3/8"
ORS	1 1/8"



## FAULTLESS MEDIUM DUTY RIGID PLATE CASTER

This Faultless Rigid Plate Caster is a companion caster to the 3300-Series Faultless Swivel Plate Caster. The heights are identical with the 3300-Series. It has a full drawn, formed, heavy gauge, steel horn. Furnished with Rubber Tired, Roller Bearing wheel.

Style No.	Diam. of Wheel	Size Plate	Lbs. Cap. Each
717-5	5"	4" x 4 3/4"	400
717-8	8"	5 5/8" x 5 15/16"	500





# HARLOW C. STAHL COMPANY

1375 E. Jefferson Avenue  
Detroit 7, Mich.



**Heavy Weight  
Stock Pots**  
In 9 sizes  
12 qts. to 36 qts. avail-  
able with or without  
faucet.



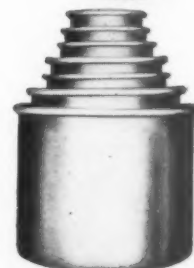
**Standard Weight  
Stock Pots**  
In 15 sizes  
6 qts. to 36 qts.



**Double Boilers**  
Pots 4 to 40 qts. Round and  
flat bottom steamers and inserts.



**Bain Marie Sets**  
Unbreakable and  
stain proof.  
In 10 sizes  
1 qt. to 36 qts.



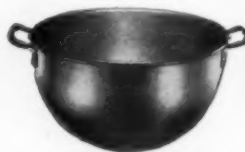
**Medium Weight  
Stock Pots**  
In 7 sizes  
10 qts. to 24 qts.



**Coffee Makers**  
With or without  
base. 4 sizes, 16 to  
36 qts. Available  
with electric unit.



**Mixing Bowls**  
In 9 sizes  
2 qts. to 80 qts.

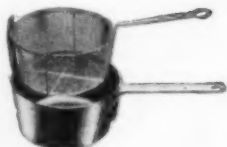
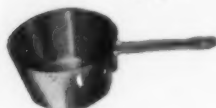


**Saute Pans and  
Pots**  
In 6 sizes  
8 qts. to 16 qts.  
Large sizes with  
loop handles.



**French Fryers**  
In 3 sizes  
5 qts. to 12 qts.

**Windsor Sauce Pans**  
In 5 sizes  
2 qts. to 13 qts.



## INCLUDE QUALITY AND DURABILITY IN YOUR SCHOOL BUDGET

Recognized and accepted by school officials across the country for both quality in materials and workmanship. One of today's outstanding lines with extra strength built in where wear is greatest. Excellent, easy to clean finish, strong handles, convenient sizes for every size school feeding program.

LET US SEND YOU  
OUR COMPLETE  
CATALOG  
AND PRICE LIST

**HARLOW C. STAHL**  
*Company*  
1375 E. Jefferson Ave. • Detroit 7, Mich.

# BOONTON MOLDING COMPANY

Boonton, New Jersey

## HEAVY DUTY



## The QUALITY Line of Melmac\* Tableware



# 101 Compartment Plate . . . 9 3/4"



# 102 Large Dinner Plate . . . 10"

# 103 Dinner Plate . . . . . 9"

# 104 Salad Plate . . . . . 8"

# 105 Sandwich Plate . . . . . 7"

# 106 Bread and Butter Plate. 6"



# 201 Cup with Handle . . . 7-oz.

# 202 Cup Saucer . . . . . 6"



# 203 Tea Cup (ovide) . . . 6 1/2-oz.



# 204 Bouillon Cup . . . . . 7-oz.

Looks and feels like china, but practically unbreakable. 1/3 the weight of china. Functional design for ease in handling and stacking. Retains hot and

cold serving temperatures of food due to insulating quality. Reduces handling "clatter". Easily maintained by recommended dishwashing methods.

### Complete Service Available in 7 Colors

POWDER BLUE, GOLDEN YELLOW,  
SEA FOAM GREEN, TAWNY BUFF, STONE GRAY,  
FOREST GREEN AND CRANBERRY.

\* The Melmac ® compound is permanently hardened or thermo-set by a scientific combination of heat and pressure. Once out of the molds, it will not soften under further application of heat.



# 301 Vegetable Dish . . . . . 5-oz.

# 302 Fruit Dish . . . . . 6 1/2-oz.



# 303 Soup Dish . . . . . 10 3/4-oz.



# 304 Nappy . . . . . 16-oz.

# 306 Nappy . . . . . 11-oz.



# 305 Soup or Cereal Bowl. 15-oz.

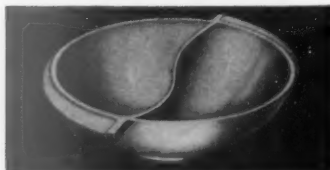


# 602 Creamer . . . . . 9-oz.

# 603 Sugar Bowl and cover . . . . . 11-oz.



# 604 Veg. Serving Dish or Salad Bowl . . . . 8 1/2"



# 605 Veg. Serving Dish, Divided . . . . . 8 1/2"

### SPECIFICATIONS

Standard Packages contain same items, one color

ITEM	STANDARD PACKAGE	CARTON WEIGHT	ITEM	STANDARD PACKAGE	CARTON WEIGHT
# 101 Compartment Plate, 9 3/4"	. . . 2 doz.	23 lbs.	# 302 Fruit Dish, 6 1/2-oz.	. . . . . 4 doz.	18 lbs.
# 102 Large Dinner Plate, 10"	. . . 2 doz.	23 lbs.	# 303 Soup Dish, 10 3/4-oz.	. . . . . 4 doz.	20 lbs.
# 103 Dinner Plate, 9"	. . . . . 2 doz.	17 lbs.	# 304 Nappy, 16-oz.	. . . . . 4 doz.	22 lbs.
# 104 Salad Plate, 8"	. . . . . 2 doz.	14 lbs.	# 305 Soup Bowl, 15-oz.	. . . . . 2 doz.	13 lbs.
# 105 Sandwich Plate, 7"	. . . . . 4 doz.	18 lbs.	# 306 Nappy, 11-oz.	. . . . . 4 doz.	18 lbs.
# 106 Bread and Butter Plate, 6"	. . . 4 doz.	16 lbs.	# 602 Creamer, 9-oz.	. . . . . 1 doz.	5 lbs.
# 201 Cup with handle, 7-oz.	. . . 4 doz.	16 lbs.	# 603 Sugar Bowl and cover, 11-oz.	. . . 1 doz.	12 lbs.
# 202 Cup Saucer, 6"	. . . . . 4 doz.	16 lbs.	# 604 Veg. Serving Dish or Salad Bowl, 8 1/2"	. . . . . 1/2 doz.	7 lbs.
# 203 Tea cup (ovide), 6 1/2-oz.	. . . 4 doz.	15 lbs.	# 605 Veg. Serving Dish, Divided, 8 1/2"	. . . . . 1/2 doz.	8 lbs.
# 204 Bouillon Cup, 7-oz.	. . . . . 4 doz.	14 lbs.			
# 205 Mug, 10-oz.	. . . . . 4 doz.	16 lbs.			
# 301 Vegetable Dish (Round), 5-oz.	. . . 4 doz.	14 lbs.			

Ask your regular Supply House about BOONTONWARE  
or write direct to Boonton Molding Company, Boonton, N. J.

# KEYES FIBRE COMPANY

420 Lexington Avenue  
New York 17, N. Y.

BEAUTIFUL, ECONOMICAL, DURABLE

## KYS-ITE

Reg. U.S. Pat. Off.

PLASTIC TABLEWARE AND  
SERVING TRAYS

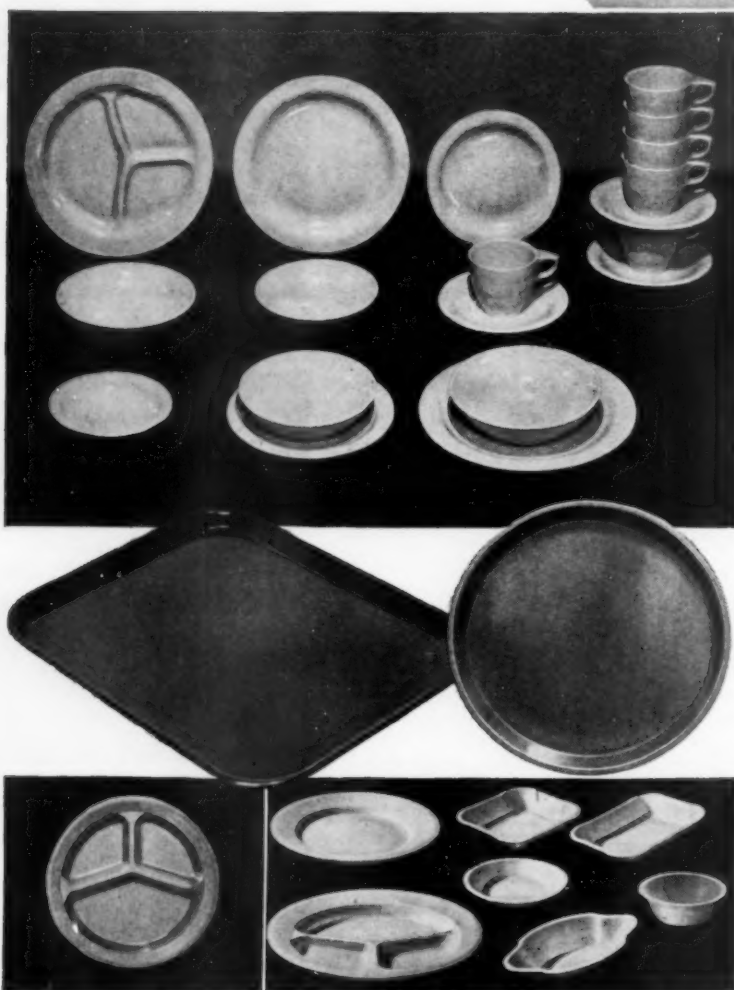
**STRONG YET LIGHT**... in regular usage, KYS-ITE is practically unbreakable... resists chipping or cracking... but it's light in the users' or dishwashers' hands.

**CAN BE STERILIZED IN BOILING WATER**... unharmed by ordinary washing compounds.

**STAYS BEAUTIFUL**... Color extends through the material... not a surface finish that soon wears off.

**EASY TO KEEP CLEAN**... the smooth, hard surface comes clean in a jiffy... great time and work saver.

**QUIET**... non-resonant, non-reverberating... ends annoying, nerve-straining kitchen clatter.



**FOR CHILDREN'S SELF-SERVICE**... even a tot can tote a full meal (beverage, too) in this lightweight KYS-ITE 3 partition plate. Replaces trays—saves dishwashing and storage space.

**CHI-NET "SINGLE-SERVICE" TABLEWARE AND FOOD CONTAINERS**... molded from wood pulp, cost so little you can use once and throw away. Hold heavy portions without bending... resistant to moist and greasy foods. Good looking, sanitary, convenient—saves dishwashing.

### KYS-ITE PLASTIC TABLEWARE

"Looks like fine china", you'll say. But by using this durable, beautifully designed tableware in place of china, you end continual breakage expense (which runs as high as 100 percent annually on certain items). Figure the saving there and you'll realize it's not long before KYS-ITE has paid for itself.

#### KYS-ITE PLASTIC TABLEWARE Attractive Maple Color Only

Code No.	Size	Standard Minimum Package	Wt. Per Standard Pkg.
239	5" Dia. Fruit or Vegetable Dish	6 Doz.	10 Lbs.
232	5½" Dia. 12 oz. Bowl	6 Doz.	17 Lbs.
233	6" Dia. 16 oz. Bowl	6 Doz.	21 Lbs.
236	7" Plate	6 Doz.	16 Lbs.
237	9" Plate	6 Doz.	31 Lbs.
231	11" Dia. 3-Partition Divided Plate	1 Doz.	7 Lbs.
238	9½" Dia. 3-Partition Divided Plate	6 Doz.	37 Lbs.
234	6½" Saucer	6 Doz.	13 Lbs.
235	7½ oz. Cup	6 Doz.	19 Lbs.

#### KYS-ITE PLASTIC SERVING TRAYS Available in Red, Blue or Brown

111	18" x 14" Serving Tray	1 Doz.	26 Lbs.
112	16½" x 12¼" Serving Tray	1 Doz.	18 Lbs.
113	13¾" x 10¼" Serving Tray	1 Doz.	13 Lbs.
114	20¾" x 15¾" Serving Tray	1 Doz.	36 Lbs.
115	22" x 16" Serving Tray	1 Doz.	41 Lbs.
116	6½" x 4½" Hospital or Change Tray	6 Doz.	13 Lbs.
131	11" Dia. Round Serving Tray	1 Doz.	9 lbs.



Plant at Waterville, Maine

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



# KEWANEE INDUSTRIAL WASHER CORP.

Kewanee, Illinois



## KEWANEE DISH WASHERS

*Cost much less . . .*

than you'd expect for a complete dishwashing operation! Every school lunch or cafeteria can afford this large capacity unit. It washes and sanitizes up to 3000 dishes per hour . . . also handles glasses, silver, pots and pans. Compact, it requires little floor space.

### FEATURES

**Sparkling Clean, Sanitized Dishes.** Hot turbulent water at pressure rate of 400 gals. per minute in washing tub . . . 180° rinse water for complete immersions in rinse tub.

**Heats Its Own Water . . .** no booster is necessary. 20,000 B.T.U. gas burner centered below each tub.

**Cuts Time and Costs.** Fast automatic operation gives you more clean dishes in less time . . . reduces your labor requirements. Designed to use the minimum of compound and water.

**Needs Little Maintenance . . .** just small periodic amounts of grease and oil. Easy to operate.



### SPECIFICATIONS

Stainless steel top, drainboard and backsplash . . . cabinet of 18 gauge steel with high lustre hammertone baked enamel finish. Double wall construction with insulation between tubs and front panel. Dimensions: 64½" x 23" x 31".

"Never-Leak" centrifugal pump—only one moving part. Continuous waste requires only one plumbing connection.

Furnished with two dish baskets, one silver basket, two pilot lights, two thermometers. Optional equipment: Robertshaw thermostats, Baso safety valves, swing faucet and glass sterilizer basket.



## Pre-Wash

Meets the strictest health department dish washing requirements at low cost and in minimum floor space. KEWANEE Pre-Wash Models have all the features of KEWANEE Standard Units plus a built-in pre-wash operation.

Shower head spray removes gross soil from all dishes . . . prevents carry-over of soil to washing compartment. Cuts detergent costs . . . saves on water and gas. Goes beyond ordinary three-tub units in providing sanitized dishes.

Mixer valve holds temperature of spray at approximately 107° F. . . maintains regulated pressure. Foot lever spray control facilitates operation.

Pre-washing tub is stainless steel in all models . . . also serves as a scullery sink. Furnished with sturdy perforated inset tray to collect soil.

*Write for Full Information*

KEWANEE INDUSTRIAL WASHER CORP., Kewanee, Illinois

# JOHN SEXTON & CO.

Manufacturing Wholesale Grocers

CHICAGO • LONG ISLAND CITY • DALLAS • ATLANTA • PITTSBURGH • DETROIT • PHILADELPHIA • BOSTON

## SEXTON SELLS MORE TRAINED BUYERS THAN ALL OTHER WHOLESALE GROCERS

These Are Equally Divided Between Men and Women



*Women buyers judge largely by intuition. Appreciate immediately the value of new products in brightening their service. Weigh the value of the product in their individual service rather than by a price standard alone.*

*Men buyers are apt to depend upon careful analysis. Slower to accept new items because they prefer to have things more standardized. Sometimes over-emphasize price as a factor in their determination.*

Buyers for the institutional and restaurant field—whether men or women—are the shrewdest and most experienced there are. They are skilled in the technique of appraising foods. They make full use of scientific methods of ascertaining food cost. They weigh the cost of waste in making their decisions.

Sexton sells to 60,000 individual units in this great

market. The remarkable growth of the company has been based entirely on quality and service. A policy of fine merchandise, carefully packaged, fairly priced and promptly delivered has won the confidence and good will of these trained buyers. Throughout the years Sexton has based every step of its growth upon that platform.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# Sexton QUALITY FOODS

SELECT YOUR NEEDS FROM THE LARGEST INVENTORY EVER ASSEMBLED FOR THOSE WHO MUST FEED MANY PEOPLE EVERY DAY

## BEVERAGES

Superb Tea, Cocoa, Instant Chocolate, Coffee

## FRUIT JUICES

Tree Ripened—Scientifically pressed

## FRUIT NECTARS

Apricot, Blackberry, Peach, etc.

## VEGETABLE JUICES

Healthful & Satisfying

## \*GELATINE DESSERTS

6 Exquisite Flavors

## \*PUDDING DESSERTS

6 Delicious Flavors

## \*PUDDING SAUCES

Taste Delights

## \*BAKING REQUISITES

of All Kinds

## \*EXTRACTS

Superb Flavorings

## NUT MEATS

Fresh Shelled Favorites

## FLOURS, PREPARED

All Cake and Biscuit Mixes

## \*SPICES—HERBS—SEEDS

Every Kind—Whole or Ground

## PEANUT BUTTER

Creamy Spread, Crunchy, Conventional

## \*FOOD COLORINGS

All Popular Colors

## \*FOUNTAIN FRUITS

Crushed Fruit and Toppings

## \*FOUNTAIN SYRUPS

10 Delightful Flavors

## TABLE FRUITS—CANNED

50 Sexton Fruits in No. 10 tins

## PIE FRUITS, CANNED

13 Popular Varieties

## VEGETABLES, CANNED

60 Sexton Vegetables in No. 10 tins

## FISH, CANNED

20 Deep Sea Delicacies

## RESTRICTED DIET FOODS

15 Fruits—10 Vegetables

## CHILI CON CARNE

Prepared or the Ingredients

## \*JELLIES

8 Different Kinds

## \*PRESERVES—MARMALADES

25 Superb Fruit Spreads

## CEREALS

All Varieties Beans, Rice, Peas, and Meals

## \*SAUCES

A Sauce for Every Taste

## \*SALAD DRESSINGS

French, Salad or Mayonnaise

## OLIVES

Green, Stuffed or Ripe

## \*PICKLES, SWEET OR DILL

All sizes, Cuts & Mixed

## SOUPS

8 Healthful Varieties

## CHOP SUEY SPECIALS

All Necessary Ingredients

## MACARONI—SPAGHETTI

All Styles and Shapes

## DRIED FRUITS

Always the New Season's Pack

## PAPER GOODS

Napkins, Doilies and Tray Covers

## SOAPS and DETERGENTS

Economical Cleansers of All Kinds

## JANITOR SUPPLIES

Brushes, Brooms, Other Requisites

\*MANUFACTURED IN SEXTON SUNSHINE KITCHENS

**JOHN Sexton & co.**  
*Manufacturing Wholesale Grocers*

CHICAGO • LONG ISLAND CITY • DALLAS • ATLANTA  
PITTSBURGH • DETROIT • PHILADELPHIA • BOSTON

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



# TOLEDO SCALE COMPANY

Toledo 1, Ohio

## Your Choice!

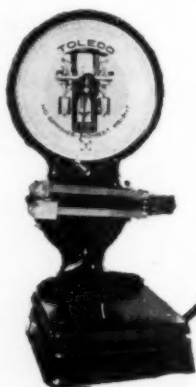


**MODEL 419 "AIRLINER" MAIL SCALE.** Specially designed for air mail ... equally efficient for first class mail and parcel post to 3 lb. All mechanism enclosed. Other models for maximum capacity.

**MODEL 4032 LABORATORY SCALE...** for laboratory work, excellent for hospitals. A 500 gram chart is graduated by one gram, and 1/64 ounce. Hairline indication assures correct reading. Toledo test weights are furnished with this model.



**MODEL 1821 PORTABLE RECEIVING SCALE.** Excellent for weighing-in food products and other supplies. Assures a closer cost control over incoming shipments. Available in variety of capacities up to 1600 lb.



**MODEL 0851 BENCH SCALE.** Used in kitchens, laundries, and for all types of general weighing. Can be equipped with wheeled, adjustable stand for moving. Packing house or laundry pans available.

### FOR SAVINGS IN TIME ... DEPENDABILITY AND COST CONTROL!

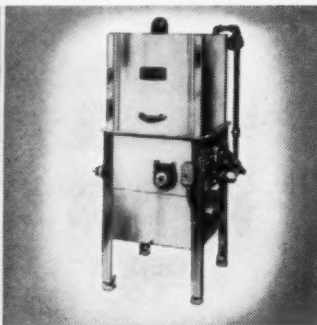
Control costs, save time with modern Scales and Kitchen Machines!

Depend on Toledo all the way for *time-saving, cost-guarding performance* in scales, dishwashers, steak machines, choppers, power saws, vegetable peelers and silver burnishers. These Toledos are *right* for your needs today... complete range of models... backed by outstanding engineering and precision manufacture. Get more details now... send for bulletin 1171. Toledo Scale Company, Toledo 1, Ohio.

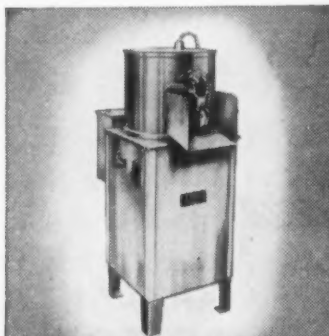
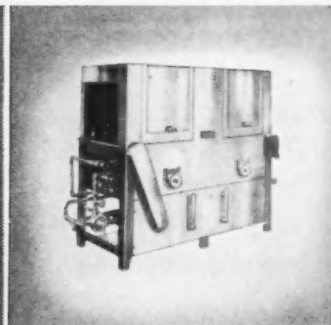
## TOLEDO SCALES KITCHEN MACHINES



**TOLEDO SPEEDWEIGH "PREDETERMINED-WEIGHT" SCALES** for rapidly and accurately weighing portions and ingredients in kitchens and many other uses.



**TOLEDO-STERLING DISHWASHERS...** both door-type and conveyor machines in full range of sizes and capacities. Also, Hydro-Scrap models for pre-dishwashing.



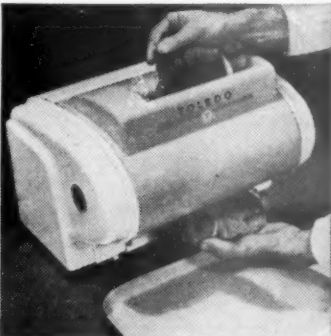
**TOLEDO-STERLING PEELERS** for Potatoes and Vegetables... complete line, 15, 30, 45, 50, 60 and 70 lb. capacities. Rapid operation.



**SAWS.** Better cutting faster! Big capacity... new speed and ease in cleaning. Illuminated meat table.



**CHOPPERS.** New speed... gravity feed... clean modern beauty. Choice of three sizes.



**STEAK MACHINES.** Make delicious Toledo Steaks! Machine is safe... easy to clean and keep clean.

# UNIVERSAL DISHWASHING MACHINERY CO.

45 Windsor Place, Nutley 10, New Jersey

27 MODELS TO CHOOSE FROM...A SIZE TO HANDLE THE NEEDS OF THE SMALLEST SODA FOUNTAIN TO THE LARGEST KITCHEN

INVEST IN  
THE BEST

ASK US  
ABOUT

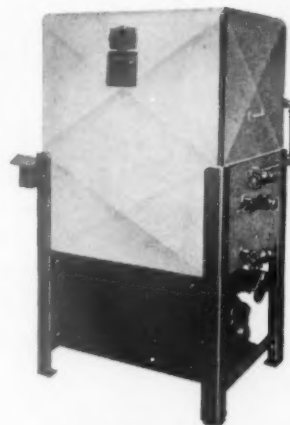


\* Pat. Applied for.

**YOU GET 50% BETTER DISHWASHING WITH "SWING-WASH" WASHING ACTION. "SWING-WASH"**

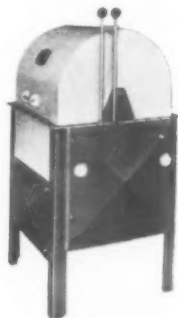
oscillates the dish racks under washing spray—creates a constantly-changing water pattern—scours dishes, cups, plates, silverware cleaner—quicker! You can get up to 50% more capacity from your dishwashing machine—you can make a smaller initial investment do a bigger job and save money every time you use it.

"Swing-Wash" Action is available in Models HD, HDC, M, E, Y, J2, MM, N and A.



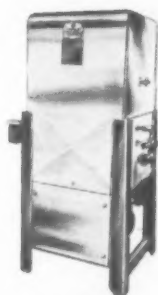
**MODEL M**

One tank, straight through (doors). Floor space 28 x 30. 2,000 dishes per hour. Motor 1 h.p. Wash tank capacity 25 gal.; pump capacity 180 gal. Five 20 x 20 racks. Also available as Model E for corner operation.



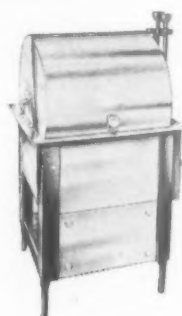
**MODEL D**

One tank, straight through, roll top. Floor space 24 x 24. 1,250 dishes per hour. Motor 1/2 h.p. with high power wash. Wash tank capacity 15 gal.; pump capacity 100 gal. Four 20 x 20 racks.



**MODEL HD**

One tank, straight through (doors). Floor space 26 x 24. 1,250 dishes per hour. Motor 3/4 h.p. Wash tank capacity 15 gal.; pump capacity 140 gal. Four 18 x 18 racks. Also available as Model HDC for corner operation.



**MODEL B**

One tank, straight through, roll top. Floor space 20 x 20 with adjustable height. 625 dishes per hour. Motor 1/2 h.p. Wash tank capacity 7 gal.; pump capacity 75 gal. Three 16 x 16 racks.

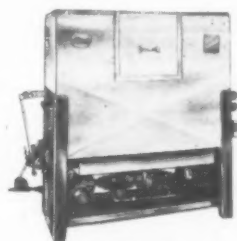


**UNIVERSAL HI-SPEED SCRAPER**

Machine scraping eliminates double handling of dishes; thoroughly washes and reduces amount of refuse for disposal; reduces dilution of detergents and wash water as cleaner dishes enter dishwashing machine. Refuse is emptied directly into disposal cans without handling. Can be used in combination with any make of dishwashing machine.

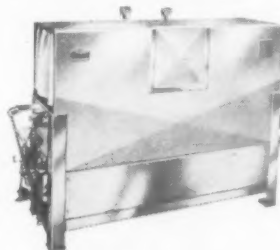
Model "P" Push Through Type

Model "PC" Pawl Conveyor Type



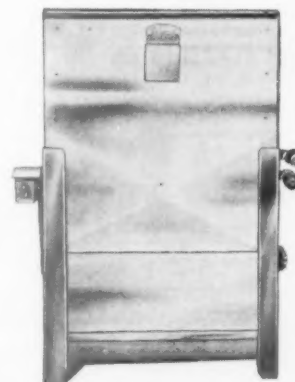
**MODEL Y**

One tank, automatic pawl conveyor (curtains). Floor space 28 x 46 1/2. 3,000 dishes per hour. Motor 1 1/2 h.p. Wash tank capacity 38 gal.; pump capacity 250 gal. Seven 20 x 20 racks.



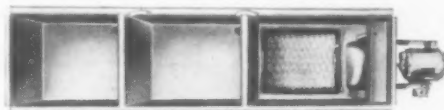
**MODEL MM**

Two tanks, automatic pawl conveyor (curtains). Floor space 28 x 70 1/2. 5,000 dishes per hour. Motor 2 h.p. Wash tank capacity 27 gal.; rinse tank capacity 27 gal.; pump capacity 360 gal. Ten 20 x 20 racks.



**MODEL U**

One tank, push through (curtains). Floor space 28 x 34 1/2. 2,000 dishes per hour. Motor 1 h.p. Wash tank capacity 25 gal.; pump capacity 180 gal. Five 20 x 20 racks.



**MODEL T3**



## TANK IMMERSION TYPE AVAILABLE

in two-tank model with 2,000 hourly dish capacity and in three-tank model with 2,500 hourly dish capacity.

Write for Complete Catalog

**World's Largest Exclusive Producer—DISH, GLASS AND SILVER WASHING MACHINES**

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# HERCULES FOOD SERVICE EQUIPMENT, INC.

1075 Metropolitan Avenue, Brooklyn 6, N. Y.

MANUFACTURERS OF METAL PRODUCTS



FOR THE PREPARATION OF FOOD

## School Kitchen Equipment and Utensils Built to Last a Lifetime



### INSULATED FOOD CARRIER

Rugged, reinforced heavy-duty carrier with heavy wire pole-carrying loops. Gray Duco exterior. Neoprene gasket under cover for airtightness. Stainless steel interior. Capacity 7½ gallons. Can be fitted with 2 seamless drawn aluminum insets of 11 quarts each, 3 of 5 quarts each, or 4 of 3½ quarts each.

### HERCULES ALUMINUM WARE



### DOUBLE BOILER



### STOCK POT



### MIXING BOWL



### BAKE AND UTILITY PAN



### COLANDER

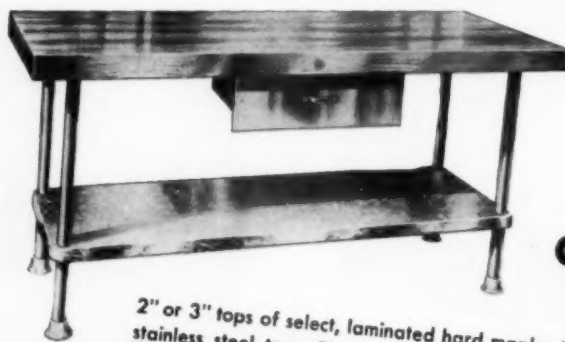


### SWILL GUARD



### HERCULES SINKS

Available in 1-2-3 compartments. Drainboards in sizes 18-24-30-36". Made in 12, 14, 16 and 18 gauge. Stainless steel 18-8 grade. Can be furnished with or without Hercules' Combination Swill-Guard and Overflow. A feature found in no other sinks. Optional at slight extra cost.



### COOK'S TABLE

2" or 3" tops of select, laminated hard maple. Also available with stainless steel top. Spot welded, heavy gauge galvanized iron drawers, mounted on ball-bearing slides...non-tilting...will carry 50 lbs. of weight. Removable for easy cleaning. 16 gauge galvanized iron undershelf with rounded welded corners. 1¼" iron pipe legs, gray Duco finish. Legs fasten to iron channels which are lag bolted to bottom of table. Shipped k-d in 14" thick crate... Great savings on freight, handling, delivery. Easy to assemble.

Hercules products are noted for high quality and generous value. For complete description, send for our new catalog.



LOOK TO



# Hotpoint

foremost name in

## COMMERCIAL ELECTRIC COOKING

for  
**HEAVY-DUTY  
INSTALLATIONS:**

The new Hotpoint

*Glamour Line\**

... finished in PERMALUCENT  
for the "always-NEW LOOK!"

Hotpoint's exclusive new silver-gray  
PERMALUCENT finish is a specialized  
development for commercial cooking  
purposes, providing "premium" beauty,  
durability and ease of cleaning at a  
price ANY operation can afford!

\*A Companion Line to the Standard Line of  
Hotpoint Commercial Electric Cooking Equip-  
ment. Also available in Stainless Steel.

OVENS • GRIDDLES • RANGES  
BROILERS • FRY KETTLES

and the New **SUPERange**  
with Recipe Robotrol

... first and ONLY range with  
accurate automatic surface cooking con-  
trol all the way from 250° to 850°



for  
**COUNTER COOKING:**

Hotpoint Custom-Matched  
Electric  
Counter Appliances

designed for

*Counter Showmanship*

HOTPOINT'S "EXTRA"  
MERCHANDISING FEATURE



For the latest and best in commercial  
cooking equipment ... or for the assistance of  
Hotpoint's planning and advisory service  
in this highly specialized field ...  
contact ...

**Hotpoint**  
A General Electric Affiliates  
205 South Seely Avenue  
Chicago 12, Illinois

#### ZONE OFFICES

ATLANTA 3, GEORGIA—204 New York Building  
CLEVELAND 14, OHIO—1832-1833 Union Commerce Building  
DALLAS 7, TEXAS—Room 518, Irving Center Building  
NEW YORK 22, NEW YORK—270 Lexington Avenue  
PHILADELPHIA 7, PENNSYLVANIA—Room 1918-19  
131 South Broad Street Building, Broad & Sanson Streets  
SAN FRANCISCO 3, CALIFORNIA—Western Merchandise Store  
1545 Market Street  
CANADA: Canadian General Electric Co., Ltd., Toronto, Ontario

# Hotpoint Glamour Line

## RANGES



The Hotpoint SUPERange is available with 3 12" x 24" Griddle-Hotplate Top sections, or with 2 12" x 24" Griddle-Hotplates and 2 Round Hotplates.



**Hotpoint Glamour Line Medium-Duty Range**—Ideal for small restaurants, read-side stands, fountain lunches, etc. Custom Top: Choice of 4 types of top units in 7 standard combinations: Round hotplate units; automatic griddles in 2 sizes; and Hi-Speed Calrod Units. Separate, independent 3-heat switches for hotplates and Hi-Speed Units—Oven: Large, all-purpose type with upper and lower interchangeable Calrod® Heating Units, separately controlled for directional heat control. Adjustable automatic temperature control. Capacity, 30 lbs. of meat or 8 1-lb. loaves of bread.

**Voltages** 208 (197-219) or 230 (220-240), single or 3-phase. AC or DC. 30" wide, 32" deep, 36" high over-all. Oven, interior: 19" wide, 21 1/4" deep, 11 1/4" high. Rated oven wattage: 3.6 kw.



## New and Revolutionary

## SUPERange with Recipe ROBOTROL

Food service operators express the belief that the Hotpoint SUPERange will completely change surface cooking—introducing new standards of product perfection, and new speed, ease and simplicity in operation.

With Recipe ROBOTROL, the Hotpoint SUPERange enables cooks to set and get (on the dial!) EXACT surface cooking heat all the way from 250° to 850° on each of three griddle-hotplate top sections. This was never possible before... and no other range can offer this precision control!

Morning, noon and night—Around-the-Clock—the Hotpoint SUPERange provides the exact cooking facilities needed. It can be used as a griddle in the morning, as a hotplate for noon meal preparation, again as a griddle for dinner work... or in any combination of griddle-hotplate work the hour of the day requires.

Because SUPERange offers such unmatched flexibility, it cuts in half the number of ranges needed... permits a more efficient, space-saving kitchen layout.

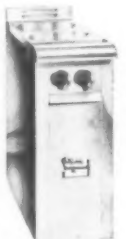
The SUPERange all-purpose oven provides outstanding flexibility for baking and/or roasting, with a capacity of 10 1-lb. loaves, 1 roll pan, or 60 lbs. of meat. Upper and lower Calrod® Units permit "directional heat" distribution with accurate, sensitive thermostatic control from 200° to 500°.

**Standard voltages only:** 208 (197-219), 230 (220-240) AC. Single or 3-phase. Over-all dimensions: 36" wide, 32" high, 38" deep. Finish: Permalucent—a lustrous silver-gray hammer-type enamel that withstands grease, fumes, cleaning compound, and remains colorfast even under high heat. Doesn't show grease smears or fingerprints... stays new-looking. Chrome-plated steel top. Chrome-plated steel oven door handle with non-conducting red plastic hand guard. Red plastic switches and control knobs.

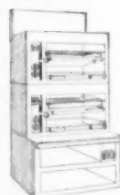
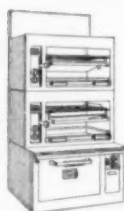
**Ad-A-Foot Section**—"Growth capacity" for the Hotpoint SUPERange! A matching unit that can be added to fit flush with either side of range and provide an additional 12 inches of range-top surface... Or it may be banked with the Hotpoint Heavy-Duty Fry Kettle. Ideal for use as a Baker's Stove.

**Backshelf Broiler**—Mounted at the rear top of the SUPERange to provide an effective broiling area 22 1/2" wide, 16" deep. Fast, efficient Calrod Heating Unit with reversible, indicating 3-heat switch. Broiler grid height adjustable by means of lifting mechanism and convenient operating handle. Removable drip pan. Backshelf is also available without broiler.

Over-all height, 34". Connected load, 5.25 kw.



## BROILERS



**Hotpoint Broilers**—Five models provide electric broiling for operations of every size: (1) Single broiler, unmounted; (2) mounted on the Hotpoint 1-Pan, All-Purpose Oven (see facing page, top) or (3) on a cabinet base; (4) double broiler, mounted on the oven, or (5) on a cabinet base. Radiant Calrod Heating Units assure "true broiling." Maximum flexibility of operation—either one-half or the entire broiler may be kept at standby or operating temperature. Vertical grid adjustment about 6", with spring-counterbalanced lifting mechanism.

**Voltages:** 208 (197-219) or 230 (220-240) AC or DC. Single or 3-phase. Connected load of each broiler section, 10.5 kw. Grid area 25" wide, 22 1/4" deep.

## FRY KETTLES

**Hotpoint Glamour Line Fry Kettle (Model HKG5)**—Turns out 51 lbs. of French Fries per hour. Fat capacity 25 lbs. Calrod Heating Units are immersed directly in fat for accurate, efficient temperature control! Also available without stand for counter mounting; and with extended top to bank with Hotpoint SUPERange.

**Voltages:** 208 (197-219), 230 (220-240) AC, Single phase or 2 phases of 3-phase circuit. Connected load, 10.0 kw. Dimensions: 20" wide, 24 1/2" deep, 32" high.

**Hotpoint Glamour Line Fry Kettle (Model HKG46)**—Turns out 90 lbs. of French Fries per hour. Fat capacity 60 lbs. Sidewall Calrod Immersion Units minimize cleaning problem, eliminate heat loss.

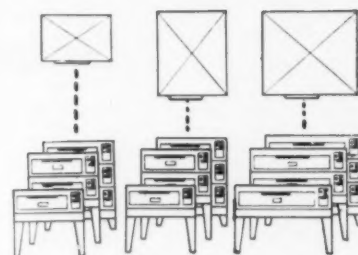
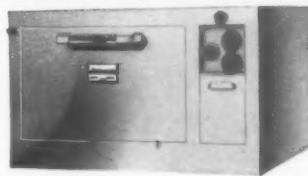
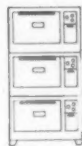
**Standard voltages:** 208 (197-219) or 230 (220-240) AC, Single phase or 3-phase. Connected load, 18.0 kw. Dimensions: 24" wide, 38" deep, 32" high.



# HEAVY-DUTY COMMERCIAL EQUIPMENT

## OVENS

**ALL-PURPOSE OVENS**—Available in 1-pan and 2-pan types, each in 1-, 2- or 3-deck assemblies to fit your requirements.



**"Directional Heat" for Cooking Perfection.** Hotpoint Glamour Line Ovens offer users the advantages of directional heat; separate switches control independent Calrod Units at the top and bottom of each oven section. Top and bottom heat can be varied to suit the individual product.

**Faster, Dependable Calrod Units!** New, super-efficient, super-tough Calrod Heating Elements give every Glamour Line Oven greater-than-ever speed, efficiency and trouble-free serviceability. Fast, accurate, designed to pour uniform heat into every cubic inch of oven space, these new Calrod Units reduce non-productive preheating time, maintain correct cooking temperatures with unparalleled uniformity and constancy.

Almost impossible to harm or destroy through normal wear or the roughest handling, Calrod Units NEVER deteriorate, deliver the same even heat with top efficiency year after year after year!

**New Hotpoint "Air-Cushion" Decks Advance Speed, Efficiency, Utility!** Exclusive new Hotpoint "Air-Cushion" decks add HOURS to the productive usefulness of Glamour Line Ovens. They speed up preheating time 46% . . . aid in even, uniform heat distribution throughout the oven . . . transmit heat uniformly even into warped cooking pans and containers . . . enable ovens to be switched over from high to lower cooking temperatures as much as 125% faster! (Air-Cushion Decks provided with all Hotpoint one and two-pan ovens.)

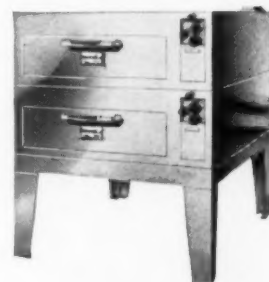
**Hotpoint Glamour Line Bake Ovens**—The exclusive advantages of "Heat Manager" controlled heat—exact, uniform, efficient, accurately measured!—for operations of every size! Oven sections each accommodate 60, 40 or 20 1-lb. loaves. Independent temperature control in each section makes it possible to bake a variety of products at different temperatures, at the same time. 2 Calrod Heating Units in each section—upper and lower—with separate switches.

**Dimensions:** Giant 60-loaf section—73 $\frac{1}{2}$ " wide, 66 $\frac{1}{2}$ " deep, 19" high; Connected load, 11 kw. 40-loaf section—54 $\frac{3}{4}$ " wide, 66 $\frac{1}{2}$ " deep, 19" high; Connected load, 7.5 kw. 20-loaf section—54 $\frac{3}{4}$ " wide, 38 $\frac{3}{4}$ " deep, 19" high; Connected load, 6.2 kw.

**Hotpoint Glamour Line All-Purpose ROASTING and Baking Ovens**—Accurate electric heat that effects a PROVED reduction in meat shrinkage! Operators find these ovens save—not pennies—but TENS and HUNDREDS of dollars in food cost alone! Each 1-pan section provides 4 sq. ft. of baking space, for 60 lbs. of meat or 10 1-lb. loaves of bread. Each 2-pan section accommodates 2 roll pans or 20 1-lb. loaves; 2 17" x 23" meat pans, for a total of 125 lbs. of meat. Available in 1-, 2- or 3-deck assemblies, with independent temperature control for each section that permits baking and/or roasting at individually correct temperatures at the same time in separate sections. Separate switches for each of 2 heating elements in each oven.

**Outside dimensions, per 1-pan section:** 36" wide, 38 $\frac{3}{4}$ " deep, 22" high. Connected load, 6 kw. Per 2-pan section: 54 $\frac{3}{4}$ " wide, 38 $\frac{3}{4}$ " deep, 23" high. Connected load 6.2 kw. Standard voltages 208 (197-219) or 230 (220-240) single phase, 3 phase or 230 (220-240) DC.

**Combines with Broiler**—The Glamour Line 1-Pan All-Purpose Oven is also available in combination with single or double Hotpoint Glamour Line Broilers.

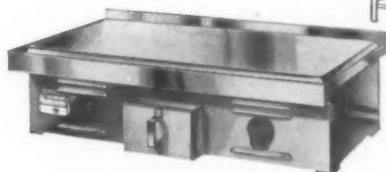
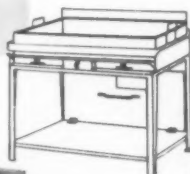


**BAKE OVENS**—3 types of bake section available—2-pan, 4-pan and 6-pan capacity. Each type available in 1-, 2- or 3-deck assemblies.

**COMBINATION BAKING AND ROASTING OVENS**—20-loaf Bake Sections and Two-Pan All-Purpose Sections may be tiered . . . to provide specialized, individual baking and roasting facilities in a minimum space.



## GRIDDLES



**Hotpoint Glamour Line Griddle (Model HGG47)**—For speed and economy in large-quantity contact frying. Rugged one-piece cast-iron grid, with separate, independently controlled Calrod Heating Elements for right and left half.

**Dimensions:** 36 $\frac{1}{2}$ " wide, 21 $\frac{1}{4}$ " deep, 11 $\frac{1}{2}$ " high; grid area, 34 $\frac{1}{2}$ " by 17 $\frac{1}{2}$ ". Voltages: 208 (197-219) or 230 (220-240) AC, Single phase or 2 phases of 3-phase circuit. Connected load 6.0 kw. Also available on permanent stand mounting (Model HGG48, over-all height 41")—with guard and cover for shallow-pan frying.

Here are a few of the outstanding highlights that distinguish the new Hotpoint *Glamour Line*

**PERMALUCENT FINISH** for the "Always-New Look"! Radiant silver-gray PERMALUCENT—Hotpoint's brilliant, brand-new finish—combines premium beauty and durability at prices you can afford. Sparkling, cheerful PERMALUCENT defies fingermarks and grease smears . . . withstands fumes and grease . . . remains brightly color-fast even under long exposure to heat! PERMALUCENT cleans with a quick rub—easily, quickly, beautifully!

**Tough Super-strong, Super-efficient CALROD® ELEMENTS** now power every Glamour Line oven. Armored in non-corroding metal, sensitive and fast in action, Calrod Oven Units are almost impossible to damage or destroy! 25% more powerful, they offer NEW speed in preheating. NEVER deteriorate!

**Sensational NEW "AIR-CUSHION" OVEN DECK** in Glamour Line one and two-pan Ovens combines—for the first time ever!—all the finest features of both STEEL and TILE decks! This revolutionary triumph of Hotpoint engineering makes possible 125% increase in speed of oven heat changeover . . . saving hours of wasteful waiting time! Sensational new construction assures uniform heat transfer to every square inch of pan surface!

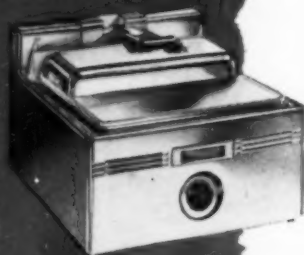
**Signal Lights for Accuracy**—In Glamour Line Ovens and Fry Kettles and on each top section of the revolutionary new Hotpoint SUPERange, bright red Signal Lights eliminate unnecessary waiting and watching.





**Hotpoint**  
CUSTOM-MATCHED

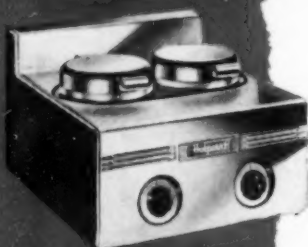
# COUNTER KITCHEN



MODEL H33  
GRIDDLE-GRILL



MODEL H32  
FRY KETTLE



MODEL H71  
WAFFLE BAKER



MODEL H91  
HOT PLATE



MODEL H32  
GRIDDLE



MODEL H91  
FOOD WARMER



Presenting a brilliant "extra" in counter merchandising:  
business building...profit building

## Counter Showmanship!

**NEW design . . . NEW efficiency . . . and an entirely NEW IDEA!** The Hotpoint Counter Kitchen brings cooking "up front" before the customer's eyes—turns it into a spectacular business-promotor and profit booster! By "staging" food preparation where the customer can watch it—on the world's most beautiful counter cooking equipment!—it makes every meal a demonstration of the appetizing, inviting advantages of electric cooking. The Counter Kitchen's sparkling cleanliness makes a dramatic impression of spotless efficiency. Customers like to watch . . . like what they see! Experience proves they buy more . . . come back more often . . . and in large numbers! And the Counter Kitchen (in addition!) cuts food costs, cuts labor costs, turns out orders faster and in larger volume—piles up record profits from the very first day!

Hotpoint Counter Kitchen appliances are finished in gleaming, non-tarnishing chrome that stays bright and new-looking for the life of the equipment! All are identical in size—17 $\frac{15}{16}$ " wide, 20" deep, 12 $\frac{13}{16}$ " high, including backsplash. Fitted together with accessory banking strips, the over-all appearance is that of a single custom-built unit.

Units can be purchased individually or as a complete Counter Kitchen. Many operators prefer to start with one or two appliances and add other units as business grows. The Counter Kitchen is adequate for all the requirements of the average lunch counter, coffee shop, drive-in, drug store, tavern, or similar type of operation.

**Hotpoint Griddle-Grill**—Turns out *combination* orders in a single operation. Combines speed of grill with large frying area of griddle for such capacity orders as 60 orders of bacon and eggs in 60 minutes! Ideal for steak, ham, hamburgers, grilled sandwiches, griddle cakes. Separate, variable temperature controls (200°-450°) for top and bottom grids. Rugged in every detail, for trouble-free long service!

*Rated wattage, 4.5 kw. Installed weight, approx. 60 lbs.*

**Hotpoint Fry Kettle**—Features the amazing new "Swing-up" immersion-type Calrod Heating Unit. Cuts fat consumption 25%—60% . . . preheats to 350° in a record 8 minutes! Accurately produces EXACT heat needed for frying each type of food. Complete fat change never required. Exclusive lift-out fat compartment simplifies cleaning; many other conveniences.

*Rated wattage, 4.5 kw. Installed weight approx. 35 lbs.*

**Hotpoint Waffle Baker**—Temperature controls adjustable to any type of batter! "Batter Brain" signals when to begin baking, when to remove perfect waffle. Patented shake-out handle vibrates waffle loose from grid, which is specially treated to eliminate sticking. No need to pry waffles loose! Exceptional easy-cleaning features!

*Rated wattage, 1.65 kw. Installed weight approx. 32 lbs.*

**Hotpoint Hotplate**—2.7 times as efficient as flame-type hotplate! Hi-Speed Calrod Units with 3-way switches: Intense "High" to start food cooking fast; economical "Medium" to sustain cooking, or for frying; super-thrifty "Low" for steaming or warming. Unbelievably rugged! Exclusive ribbed landing deck. No flame . . . no smoke . . . no soot!

*Rated wattage, 2.5 kw. Installed weight approx. 30 lbs.*

**Hotpoint Griddle**—Preheats to 400° in only 6 minutes! Exclusive Hotpoint Calrod Unit provides uniform heat over 212 sq. in. of usable frying area—with no cold spots, no hot spots! Grease and spillage drain directly into large, conveniently-removable receptacle at rear of grid. Rugged thermostat, built for heavy-duty service.

*Rated wattage, 3 kw. Installed weight approx. 48 lbs.*

**Hotpoint Food Warmer**—Stores foods at their ideal serving temperatures . . . keeps them "range fresh" and appetizing for hours with dry electric heat! Exclusive "Heat Wall" delivers just the right amount of heat into food from all four sides and bottom. Variable thermostat permits dialing the correct storage heat. Over a hundred pan and jar combinations can be used with choice of 3 adaptor top-plates available. Holds up to 4 four-quart jars! Plugs in anywhere!

*Rated wattage, 1.65 kw. Installed wt. approx. 32 lbs.*



**AWARD TO HOTPOINT** Custom-matched Counter Kitchen for outstanding achievement in engineering and design. 10th Annual Product Design Awards Competition sponsored by Electrical Manufacturing Magazine.

**HOTPOINT INC.,** A General Electric Affiliate  
205 South Seeley Avenue  
Chicago 12, Illinois

# MUTSCHLER BROTHERS COMPANY

NAPPANEE, INDIANA

LEADING MANUFACTURER OF HARDWOOD PRODUCTS SINCE 1893



## MUTSCHLER

EQUIPMENT  
ESPECIALLY  
DESIGNED FOR  
HOMEMAKING  
DEPARTMENTS

- ★ Sturdily Constructed of Northern Maple
- ★ Drawers Dovetailed Front and Back
- ★ Doors 1 1/8" Thick — Maple Plywood, Lumber Core
- ★ Master Keyed Cylinder Locks
- ★ Strong, Serviceable Hardware
- ★ Hardware Has Durable Dull Black Finish
- ★ Natural Wood or Enamel Finishes



### MODEL 1-56W — TOTE DRAWER CASE and DRAWERS

Provides individual storage of sewing and other supplies in master case, fitted with door lock. For class work, drawers may be removed and fitted into Model 20 table (illustrated at right). Over-all size: 48" wide x 81" high x 24" deep. Holds 56 drawers: 9 3/4" wide x 4 1/2" deep x 20" long. Each drawer fitted with name card holder.

### MODEL 1-56L — TOTE DRAWER CASE

Same as above without drawers.

### MODEL 20 — SEWING TABLE

Accommodates four tote drawers from Model 1-56W case (illustrated above), two on each side in stagger arrangement. Top size: 30" wide x 48" long. Two drop leaves are 15" x 30". Height of table is 30". Top is maple plywood with 1 1/4" edge banding. Linoleum or Formica tops also are available.

### PLANNING SERVICE

Complete drawings, showing recommended equipment and its arrangement, may be obtained from the MUTSCHLER planning department. Simply supply a rough sketch showing the following: 1. Dimensions of rooms; 2. Purpose of rooms; 3. Locations and sizes of doors and windows; 4. Height of window sills from floor; 5. Location and sizes of partitions, radiators, ventilators, pipes, pillars, water and gas pipes; 6. Indicate which items under No. 5 (if any) can be eliminated; 7. Estimate number of students and instructors to be accommodated at one time; 8. State whether plan is for new building or remodeling.

# MUTSCHLER EQUIPMENT ESPECIALLY



**MODEL 3 — FILING CASE** Large assortment of drawers and shelves provide storage facilities to meet many needs. Over-all size: 50" wide x 81" high x 24" deep. Has two full-width shelves, 21" deep; two half-width drawers 5-3/16" deep; three full-width drawers (top drawer 5-3/16" deep; bottom drawers 7-7/16" deep); four letter-size filing drawers and two legal-size filing drawers, all of which have follow blocks. Drawers operate on side guides. Each drawer has name card holder. Fitted with door lock.



**MODEL 2-1B — EQUIPMENT STORAGE CASE** Storage for folding tables, chairs, linens, blankets and similar material. Over-all size: 48" wide x 81" high x 24" deep. Tall compartment at right is for ironing boards, sweepers or other tall equipment. Has one fixed, full-width shelf and one 3/4-width adjustable (or removable) shelf. Fitted with door lock.

**MODEL 2 — EQUIPMENT STORAGE CASE** Same size as Model 2-1B, with no compartment for tall items. Has one full-width shelf located 36" from floor of case. Provision is made for addition of other shelves above and below stationary shelf. Fitted with door lock.

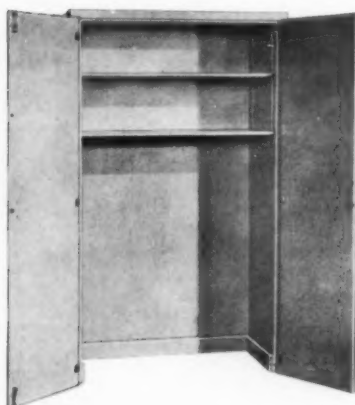
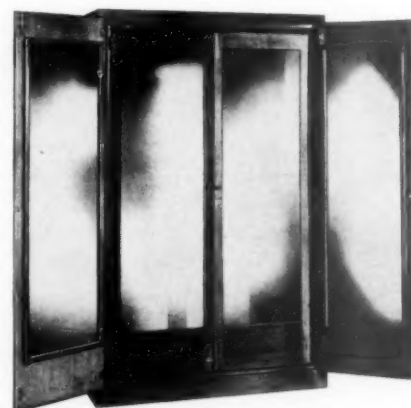
**MODEL 2-S — EQUIPMENT STORAGE CASE** Same as Model 2, complete with four adjustable shelves. Fitted with door lock.



**MODEL 11 — CHART AND MAGAZINE STORAGE CASE** Top shelf is for storage of books, and two sloping shelves are for magazines. These latter lift up and slide back, providing magazine storage space behind. Doors enclose sliding chart (or map) rack, with space to hang the 12 rails included. These rails are cork inlaid and have two sliding clip hooks for attaching charts. For classroom instruction, charts are removed from rack and suspended by the rail from grooved knobs at top of case. Over-all size: 48" wide x 81" high x 24" deep. Door lock available at extra cost.

**MODEL 4-W — WARDROBE CASE** Two sets of doors are equipped with full length mirrors which form a triplicate arrangement when outer doors are open. Behind inner doors is clothing compartment, with one full-width shelf 12" down from top, and 1" dia. chrome plated clothes hanger bar. Fitted with door lock. Over-all size: 48" wide x 81" high x 24" deep.

**MODEL 4-L — WARDROBE CASE** Same general description as Model 4-W, except for mirrors and inner doors which are omitted.



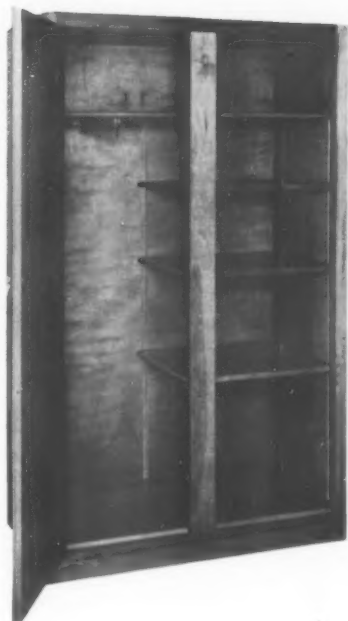
**MODEL 8-RS — ROLL-AWAY BED and STORAGE CASE** Bed compartment is 46" wide x 52" high x 21" deep. May also be used for dress forms, sewing machine or other storage. One full-width fixed shelf, with one adjustable shelf above. Over-all size: 48" wide x 81" high x 24" deep. Fitted with door lock.

**MODEL 10 — TOOL AND PAINT STORAGE CASE** Over-all size: 48" wide x 81" high x 24" deep. Top section is but 13" deep, and has one full-width fixed shelf. Rack for hanging of paint brushes, chisels and other small tools is included (not shown). Lower section has four drawers and two adjustable (or removable) shelves. Locks on doors available at extra cost.





# DESIGNED FOR CLOTHING DEPARTMENTS



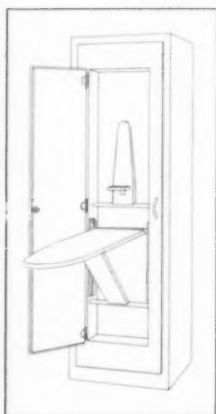
**MODEL 9 — CORNER WARDROBE CASE** Designed to utilize corner space where one bank of cases meets another in an "L". Over-all size: 48" wide x 81" high x 24" deep... blinded either right or left. Has three stationary half-shelves and one pull-out garment carrier behind blinded portion. One fixed shelf, 12" from top, is directly in from door. Door fitted with lock. Specify whether blinded right or left.



**MODEL 5 — CLOTHES LOCKER** Provides safe, convenient storage of clothing or other equipment. Has one full-width fixed shelf 12" down from top of locker compartment, 21" deep. Also fitted with 1" dia. chrome plated hanger rod and door lock. Over-all size: 24" wide x 81" high x 24" deep.



**MODEL 2424-A — APRON STORAGE CASE** Convenient for use in clothing or foods compartments. Sides and back are maple plywood, set into hardwood frame. Doors are 3/4" hollow-grid construction that prevents warping. Upper compartment has two fixed shelves. Lower storage space has revolving rack with space to hold 48 separate aprons. Any apron instantly available. Over-all size: 24" wide x 85" high x 24" deep. May be fitted with latch type lock.

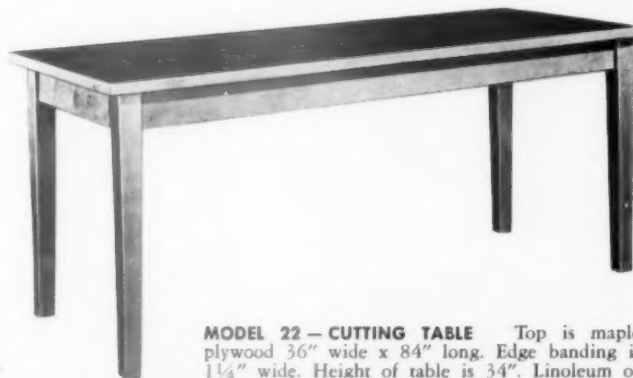


**MODEL 6 — IRONING BOARD and STORAGE CASE** Double door arrangement permits access to ironing board and sleeve board, or to storage compartment behind. Back compartment has one fixed shelf and three adjustable shelves. Over-all size: 24" wide x 81" high x 24" deep. Ironing board compartment is 16" wide and 7" deep. Lock supplied at extra cost.

**MODEL 7 — IRONING BOARD CASE** Same board arrangement as Model 6, without storage compartment. Over-all size: 16" wide x 81" high x 7" deep.



**MODEL 30 — FITTING STAND** Top is maple (or birch) plywood 18" x 18" square, with 1 1/4" pencil-round edge banding. All exposed corners rounded and snag-proof. Height is 13".



**MODEL 22 — CUTTING TABLE** Top is maple plywood 36" wide x 84" long. Edge banding is 1 1/4" wide. Height of table is 34". Linoleum or Formica tops also available.



# MUTSCHLER

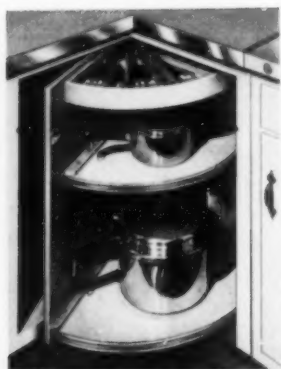
## PORTA-BILT

### FOODS DEPARTMENT EQUIPMENT



"Most convenient, most durable equipment on the market," is how leading school authorities describe *Porta-Bilt* Foods Department Equipment. Constructed of selected hardwood in oven dried enamel or natural maple finishes, *Porta-Bilt* cabinetry units may be custom adapted to any space or classroom requirements . . . efficiently and economically. Furnished with linoleum, vinyl, Formica or stainless steel sink and counter tops. Complete information and planning furnished without obligation. Ask for Catalog No. 650, illustrated at right.

## PORTA-BILT CONVENIENCE FEATURES . . . these and many others



### REVOLVING SHELF UNIT

This special purpose base unit for corner installation revolves silently, smoothly in either direction . . . brings utensils quickly within reach. Note optional fan-shaped cutlery tray.



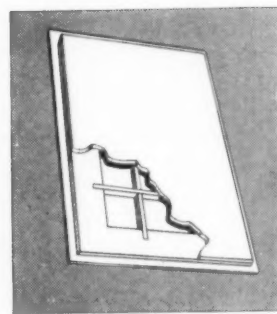
### ROLLER BEARING SHELVES

Even when fully loaded, these shelves glide in and out at the touch of a finger. Especially convenient for storage of large pans and kettles. Available in several sizes of base units.



### BASE UNIT FOR TRAYS

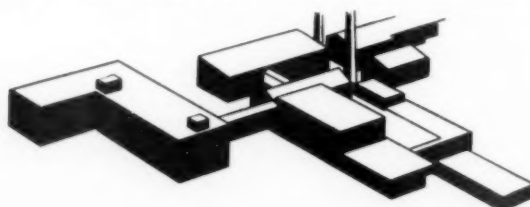
Four vertical compartments provide clean storage for trays, large plates, cookie sheets and the like. This special unit may be had in several sizes: 12", 15" and 18" widths, depending upon requirements.



### MARINE GRID DOORS

All doors of *Porta-Bilt* cabinetry units are of the special cross-grid construction shown above. These doors combine lightweight with extreme durability and resistance to warping or swelling.

**MUTSCHLER BROTHERS COMPANY**  
NAPPANEE, INDIANA





A Typical Blickman Cafeteria Installation

## A 3-Way Service FOR MASS FEEDING INSTALLATIONS

**1 ENGINEERING and LAYOUT:** Our experts are trained to evaluate the specific requirements of a particular establishment and to arrange space and equipment for most efficient operation. On approved contracts, our service includes related planning, manufacture and installation of complete units — from the small pantry or service counter to the large kitchen serving thousands of individuals.

**2 DESIGN and FABRICATION of INDIVIDUAL UNITS:** BLICKMAN engineers carefully design each item to carry out its function efficiently. Our units are noted for their welded round-corner construction — providing sanitary, crevice-free surfaces. They are easy to clean, durable and attractive in appearance.

**3 THE "KNOW-HOW" IN BUILDING FINE FOOD SERVICE EQUIPMENT:** For over 60 years, S. BLICKMAN, INC. has specialized in the planning and manufacture of food service installations for every need. Our factory is one of the largest of its kind. Experienced mechanics work with modern tools to give you the finest in food service equipment.

### INDIVIDUAL ITEMS OF FOOD PREPARATION AND FOOD SERVICE UNITS Include:

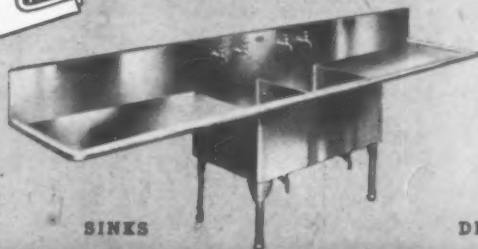
Automatic Electric Hot Food Storage Tables	Dish Heaters	Pantry Cabinets and Cupboards	Storage Bins and Closets
Bain Maries	Dish Tables	Plate Warmers	Tray Trucks
Cabinets	Dish Trucks	Preparation Tables	Utility Trucks
Cafeteria Counters	Dish Warmers	Range Hoods	Urn Stands
Cereal Cookers	Food Conveyors	Service Units	Warmers
Coffee Urns	Food Trucks	Sinks	Water Coolers
Cooks Tables	Kitchen Cabinets	Steam Tables	Work Tables
	Pan and Pot Racks		

Special equipment built to specifications • Orders subject to Government priority regulations

Send for this folder  
on Food Service Equipment



WORK TABLES



SINKS



DISH TRUCKS



COFFEE URNS



STEAM TABLES



BAKERS' TABLES

### TYPICAL INSTALLATIONS

Cornell University, Ithaca, N. Y.  
Columbia University, New York  
Syracuse University, Syracuse  
Hershey (Pa.) Industrial High School  
Bayonne (N. J.) Senior High School  
Suffern (N. Y.) Grade School  
Washington, D. C. — 15 schools  
U. S. Government: Numerous installations for the armed forces.

FROM A SINGLE UNIT TO A COMPLETE INSTALLATION

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



# THE G. S. BLODGETT CO., INC.

50 Lakeside Avenue, Burlington, Vt.

## BLODGETT

SECTIONAL  
AND  
MULTI-DECK

*Gas Fired*

## OVENS

FOR

ROASTING, BAKING  
AND  
GENERAL COOKERY



No. 959

Combining a Roasting  
and a Baking Section



No. 151

One of the 150 Series



### THE BASIC 3

Each 900 Series Oven is composed of the individually controlled units above, either singly or in combination.

Comptmt. A—Shelf Size—B  
Single 7" 33"x22" 42"x32"  
Double 7" 33"x22" 42"x32"  
\*Single 12" 33"x22" 42"x32"

\*Fitted for extra removable shelf.

There are twenty-four models—each formed from one or more Blodgett's "BASIC THREE" sections—to meet every cooking need.

You may select the proper oven for your needs from one of the following:

Cat. No.	Shelf Size	Number of Compartments	Number of Controls
911	A	1...7"	1
961	B	1...7"	1
912	A	2...7"	2
962	B	2...7"	2
913	A	3...7"	3
963	B	3...7"	3
931	A	2...7"	1
981	B	2...7"	1
932	A	4...7"	2
982	B	4...7"	2
910	A	3...7"	2
960	B	3...7"	2
901	A	1...12"	1
951	B	1...12"	1
902	A	2...12"	2
952	B	2...12"	2
909	A	1...12"	2
959	B	2...12"	2
906	A	1...12"	2
956	B	1...12"	2
907	A	2...12"	3
957	B	2...12"	3

A...33" x 22" shelves  
B...42" x 32" shelves



### The PYRASTOVE

Blodgett's revolutionary new, all-purpose stove. All-steel. Square. Top heats 30% faster. Rocket-to-whisper heat from universal 3-ring, 3-control burner, with 466 stainless steel ports. 24" high, 22½" square, 8"-12"-16" openings, in ¾" machined steel top.

GENERAL DATA—Blodgett Ovens use manufactured, natural, mixed or liquefied petroleum gases. When ordering, specify type of gas, Btu. content, specific gravity and pressure. Maximum gas input as follows: 33" x 22" x 7" section—20,000 Btu.; 33" x 22" x 7" double sections—27,000 Btu.; 33" x 22" x 12" section—22,000 Btu.; 42" x 32" x 7" section—36,000 Btu.; 42" x 32" x 7" double sections—41,000 Btu.; 42" x 32" x 12" section—38,000 Btu.

### OVEN CAPACITIES

To ascertain capacity of any oven, multiply number of decks in unit by capacity for appropriate sizes listed herewith. 12"-high compartments are equipped for an extra, removable shelf.

Sections are crated separately. Minimum entry clearance required for each section is as follows: 7" high sections—22½", 12" high section—27½", two deck section—31½".

Capacities	33"x22"	42"x32"
10" pie tins	6	12
18 x 26 bun pans	1	2
1 lb. loaves	12	24
9 x 7 roll pans	9	16
19 x 4 pullman loaves	8	14
Cup tins (13 x 10½)	4	9
#200 steam table pans	2	4
#3 bean pots	8	20
5" round casseroles	24	48
Potatoes #60	30	60
Potatoes #140	70	140
Roast pans (standard)	1	2

THE G. S.  
**BLODGETT**  
COMPANY, INC.

50 Lakeside Avenue,  
BURLINGTON,  
VERMONT

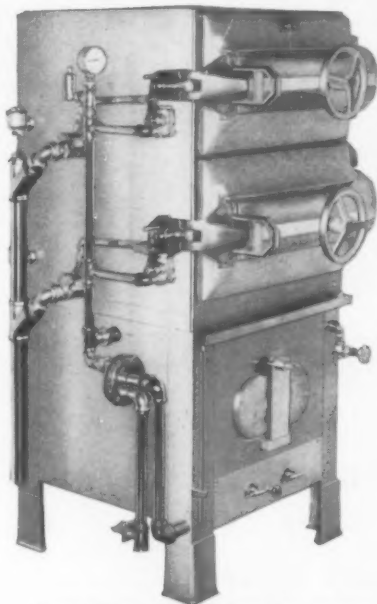
# THE CLEVELAND RANGE CO.

3333 Lakeside Ave., Cleveland 14, Ohio

## STEAM-CHEF STEAM COOKERS

for all School, College and Institution Kitchens.

Direct Steam—Gas—Electric Operation

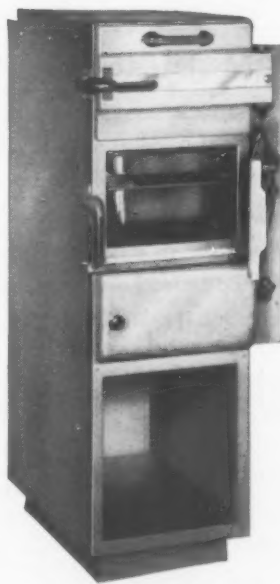


Model 2SB, Steam-generating, gas operated, two compartment. Also available in direct-connected type Model 101-2B. Capacity 4 bushels. For kitchens serving up to approximately 500 persons



Steam-Chef now offers superior Steamer Baskets! Seamless drawn stainless steel with rounded corners. Finer, lighter, more sanitary. New Frostex finish is easy to clean, impervious to food reactions. Ask for Folder A 1-D.

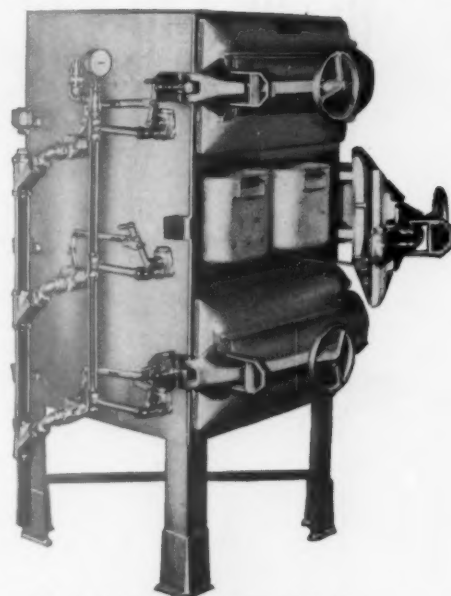
Cleveland Range has long held a position of leadership in steam cooking equipment. Ours is also the most complete line, including several models in the larger capacity Steam-Chefs, and a choice of models in the Steamcraft cookers for smaller kitchens. Thousands of Steam-Chefs are in service today in America's schools, colleges, and allied institutions. Our organization builds steamers exclusively. Most major improvements of the past 15 years were originated by Steam-Chef. Both Steam-Chefs and Steamcrafts provide many notable features of practical value to the user—each a real contribution to higher utility, economy, finer cooking, cleanliness, or safety.



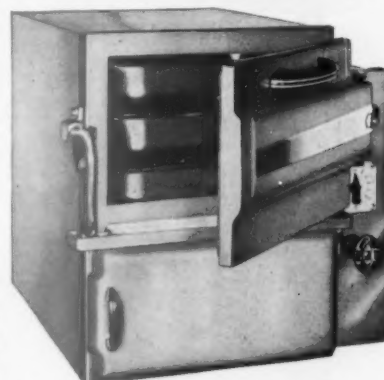
Sold through kitchen equipment dealers. Details and specifications on request—also valuable booklet: "For Better Steaming."

### STEAMCRAFT COOKERS

Steamcraft junior steamers for smaller kitchens are direct steam connected, or gas or electrically operated. For kitchens serving up to about 250 persons. To the left is shown a 2-compartment Steamcraft on base. Holds six regular 12" x 20" pans. To the right is a 1-compartment Steamcraft "Cub" counter model. Takes only a 22" space, holds 3 cafeteria pans. Base optional. Send for Steamcraft Folder SCR-7.



Model 101-3B, Direct-connected typical 3 compartment style. The most popular size for average requirements. Capacity 6 bushels. For kitchens serving up to approximately 800 persons



### PROMINENT SCHOOL INSTALLATIONS

Moharry Medical College, Nashville, Tenn.  
St. Lawrence University, Canton, N. Y.  
Tuskegee Institute, Tuskegee, Ala.  
Stanford University, Palo Alto, Calif.  
Georgia School of Technology, Atlanta, Ga.  
Northwestern University, Evanston, Ill.  
Purdue University, Lafayette, Ind.  
Southern Baptist Theological Seminary, Louisville, Ky.  
Southwestern Louisiana Institute, Lafayette, La.  
Wellesley College, Wellesley, Mass.  
Harvard University, Cambridge, Mass.  
Michigan State College, East Lansing, Mich.  
Wayne University, Detroit, Mich.  
Stephens College, Columbia, Mo.  
Dartmouth College, Hanover, N. H.  
Princeton University, Princeton, N. J.  
Cornell University, Ithaca, N. Y.  
Fordham University, New York City  
Hunter College, New York City  
Barnard College, New York City  
Yassar College, Poughkeepsie, N. Y.  
Skidmore College, Saratoga Springs, N. Y.  
Syracuse University, Syracuse, N. Y.  
Duke University, Durham, N. C.  
Baldwin-Wallace College, Cleveland, Ohio

Sacred Heart School & Convent, Pittsburgh, Pa.  
Mt. Vernon Seminary, Washington, D. C.  
Lincoln High School, Cleveland, Ohio  
Western Reserve Academy, Hudson, Ohio  
John Burroughs Jr. High School, Los Angeles, Calif.  
Canterbury School, New Milford, Conn.  
Admiral Farragut Academy, St. Petersburg, Fla.  
Groton School, Groton, Mass.  
Cranwell Preparatory School, Lenox, Mass.  
Abbott Academy, Andover, Mass.  
Phillips-Exeter Academy, Exeter, N. H.  
Blair Academy, Blairtown, N. J.  
Schneider School, Columbia, S. C.  
Bromerton High School, Bromerton, Wash.

Oberlin College, Oberlin, Ohio  
Wooster College, Wooster, Ohio  
University of Tulsa, Tulsa, Okla.  
Villanova College, Villanova, Pa.  
Bryn Mawr College, Bryn Mawr, Pa.  
Allegheny College, Meadville, Pa.  
Bucknell University, Lewisburg, Pa.  
A. & M. College of Texas, College Station, Tex.  
Brigham Young University, Provo, Utah  
Middlebury College, Middlebury, Vt.  
Virginia Polytechnic Institute, Blacksburg, Va.  
College of William & Mary, Williamsburg, Va.  
Davis-Elkins College, Elkins, W. Va.

### STATE UNIVERSITIES OF

Arkansas	Kansas	New Mexico
California	Kentucky	North Carolina
Colorado	Maine	Ohio
Connecticut	Maryland	Oklahoma
Delaware	Michigan	Oregon
Georgia	Minnesota	Pennsylvania
Idaho	Missouri	South Carolina
Illinois	Montana	Texas
Indiana	Nebraska	Utah
Iowa	New Hampshire	Vermont
Virginia	Washington	Wisconsin
		Wyoming

For BETTER Steaming—  
**STEAM-CHEF**

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

DUKE MANUFACTURING CO.  
St. Louis 6, Missouri

# THURMADUKE

FINE FOOD SERVICE EQUIPMENT



EXCLUSIVE THURMADUKE FEATURES PROTECTED  
BY U. S. AND FOREIGN PATENTS

## *The New* **UNIT-BILT** **THURMADUKE CAFETERIA COUNTER**

Another "FIRST" by THURMADUKE. The above counter consists of 5 standard units: 2 for hot food, a cold pan unit for ice or mechanical refrigeration, bottle goods display pan and urn stand. Select any combination you choose — arrange them in any order you wish and presto — they fasten together to form one rigid unit of shimmering stainless steel, rugged as it is beautiful. A counter you will be proud to own and dollars ahead to operate. Before you buy any cafeteria counter, you owe it to yourself to inspect THURMADUKE.



### **THURMADUKE PORTABLE**

Plugs in anywhere. Efficiently insulated. Keeps your food at the correct temperature and delivers it where you want it — in remote dining rooms, terraces, club rooms, locker rooms, etc. Has all the desirable features of the STANDARD THURMADUKE.



### **THURMADUKE STANDARD**

Available in gas or electric models. Stainless or enameled steel bodies, Sectional Heat Control, high efficiency insulation. Easy to keep clean, economical to operate. No unsanitary water-pan to waste fuel or breed germs.



### **THURMADUKE CAFETERIA COUNTER**

Modernize your old or new cafeteria counter with this sanitary, waterless THURMADUKE especially designed to fit into your present counter. Economical to operate, better tasting food, easy to keep clean.

**Write for our illustrated catalog No. U 469**  
**Showing our complete line of equipment**



# MARKET FORGE COMPANY

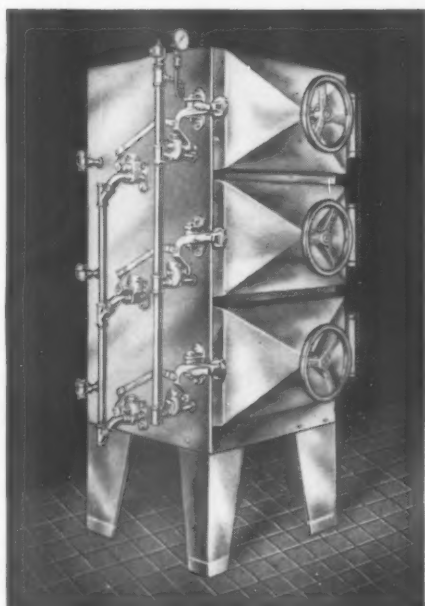
127 Garvey Street, Everett 49, Mass.

*Metal Craftsmen*



*Since 1879*

## MARKET FORGE STEAM COOKERS

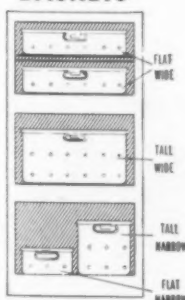


Insulated door front. Free floating inner door. Easiest door to handle. Easiest steam cooker to service, has a speedily and easily replaced gasket.

**MODEL 3M**

Direct connected Market Forge Steam Cooker. 3-Compartment, 6-bushel capacity. Equipped with synchronized thermostatic control, pressure-reducing valve. Individual steam supply, exhaust valves and thermostatic steam trap for each compartment. Safety valve and steam gauge.

### BASKETS



Available in four sizes — perforated or solid.

Tall narrow • Tall wide  
Flat wide • Flat narrow

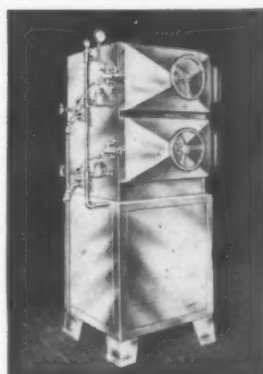
### TWO STYLES

Stainless Steel Seamless — 18-gauge, rounded corners, vermin-proof, polished finish inside and out. Fitted with  $\frac{1}{4}$ " stainless steel chest-type drop handle.

Stainless Steel Seamed — 22-gauge stock with locked-seam corners. Fitted with stainless steel chest-type drop handle.



Market Forge Steam Cookers provide the best in food service and efficiency. Economy in preparation, speed in cooking and tastier food are the direct advantages of using these outstanding Steam Cookers. Over a half century of experience in producing the finest metal products has resulted in the Market Forge reputation for design perfection and operating efficiency.



**MODEL 2MG**

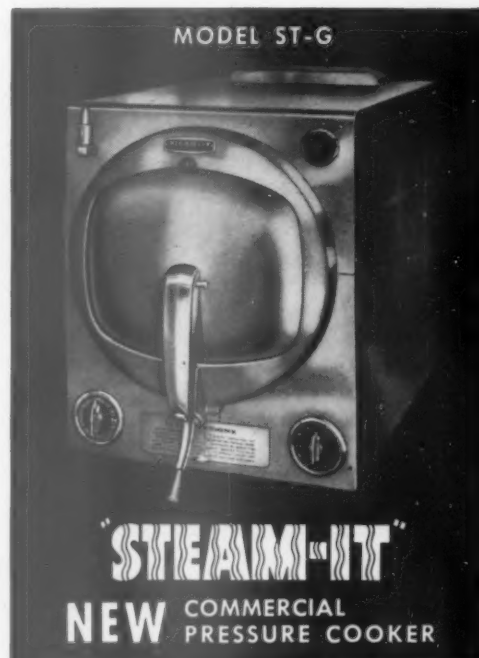
Full Automatic Gas Fired Market Forge Steam Cooker. 2-Compartment, 4-bushel capacity. For operation by gas when direct steam is not available. Equipment includes 2 H. P. Boiler, burner and controls, automatic water feeder, safety pilot and automatic gas control valve. Also Model 2M-E available for electrical operation.

### COMPARTMENT SIZES AND MATERIALS

Compartment interior dimensions:  $14" \times 23\frac{3}{4}" \times 24"$ . Door opening  $11\frac{3}{4}" \times 21\frac{1}{4}"$ . Steam Cookers are available in three different types of material. #1 is carbon steel, hot galvanized after fabrication and finished on the outside with heat-resisting enamel. #2 is stainless steel interior with heat-resisting enamel. #3 is made with stainless steel interior and polished stainless steel exterior complete with chrome-plated fittings.

Automatic Sliding Shelves pull out when doors are opened. Makes hot baskets accessible without reaching into compartment.

Intermediate Removable Shelves permit the use of additional shallow or flat baskets. Available for all models.



Only all-new counter model pressure cooker. Now makes pressure cooking available to all food service operators. Designed for frequent fresh food preparation. Economical. Pressure-cooks food (at 5-15 lbs.) in less than half the time and with half the fuel used by other methods. Gas operated — generates its own steam. Easy to install, service, operate.

Equipped with Safety Valve, Blowout Plug, Low Water Cut-off, Automatic Air Vent, Automatic Steam Vent and Timer.

Capacity: 3 Cafeteria Pans  $12" \times 20" \times 2\frac{1}{4}"$ .

# NATHAN STRAUS-DUPARQUET INC.

*Serving the School Field for More Than a Century*

33 East 17th Street — UNION SQUARE NORTH — New York 3, N. Y.

BOSTON

CHICAGO

MIAMI

NORWALK



## COMPLETE EQUIPMENT AND SUPPLIES FOR SCHOOLS

SAVE TIME . . . LET ONE FIRM FILL ALL YOUR REQUIREMENTS!

### • CHINA • GLASS • SILVER

A complete line of fine quality utensils!

Aluminumware • Enamelware • Stainless Steel Ware  
• Woodenware • Wire Goods • Cleaning Supplies.

### • KITCHEN EQUIPMENT

The latest food service equipment from America's finest manufacturers — including: Dishwashers • Glasswashers • Silver Burnishers • Peelers • Mixers • Slicers • Ranges and other Kitchen Machinery.

### • DUPARQUET KITCHEN EQUIPMENT

The finest quality specially fabricated Sinks • Work Tables • Warmers • Steam Tables, etc.

### • REFRIGERATION

The finest makes of Commercial high temperature and low temperature refrigerators. Walk-in and reach-in models, upright and chest types. DUPARQUET REFRIGERATORS manufactured for special requirements. Water Coolers • Ice Cream Cabinets.

### • FURNITURE AND FURNISHINGS

A complete display of fine furniture • Floor Coverings • Linens and Decorative Accessories.

★ *A Skilled Food Service Engineering Department!*

★ *A Skilled Decorating Department!*

★ *4 Floors of Stock for Prompt Service!*



# THE JOHN VAN RANGE CO.

DIVISION OF THE EDWARDS MANUFACTURING CO.

535-555 Culvert Street, Cincinnati 2, Ohio

BRANCHES IN PRINCIPAL CITIES



CAFETERIA

UNION BUILDING MICHIGAN STATE COLLEGE

Architect: Ralph Calder, Detroit

## *food service equipment leaders since 1847*

● Ever since its establishment in 1847 The John Van Range Company has specialized in designing and fabricating food service equipment for public and private schools and colleges.

● The first portable steel range in the world was the invention of the founder of this company. Carrying on, his successors have pioneered in developing new and improved equipment, spearheading advances in the science of mass feeding.

● When you see an unusually fine food service installation, you will undoubtedly find Van's name plate on the equipment.

● If you are planning food service equipment improvements, make use of Van's century of experience. Write today for new Van book showing illustrations of installations in all types of institutions.

### REPRESENTATIVE VAN INSTALLATIONS

Michigan State College	Lansing, Michigan
Purdue University	Lafayette, Indiana
University of Cincinnati	Cincinnati, Ohio
Hanover College	Hanover, Indiana
Holmes High School	Covington, Kentucky
St. Joseph College	Rensselaer, Indiana
Hebrew Union College	Cincinnati, Ohio
Boston Public Schools	Boston, Massachusetts
De Pauw University	Greencastle, Indiana
North Carolina State College	Raleigh, North Carolina
Ft. Thomas High School	Ft. Thomas, Kentucky
Holy Cross College	Worcester, Massachusetts
Withrow High School	Cincinnati, Ohio
University of Oklahoma	Norman, Oklahoma
Sweet Briar College	Sweet Briar, Virginia
University of Kentucky	Lexington, Kentucky
University of Texas	Austin, Texas
Instituto de la Ciudad University	Caracas, Venezuela
Marshall College	Huntington, West Virginia
Oklahoma A & M College	Stillwater, Oklahoma
Woodward High School	Cincinnati, Ohio
High School, U. S. Atomic Energy Com.	Oak Ridge, Tennessee
Ohio State University	Columbus, Ohio
Providence College	Providence, Rhode Island
Wittenberg College	Springfield, Ohio
University of West Virginia	Morgantown, West Virginia
Hiram College	Hiram, Ohio
University of South Carolina	Columbia, South Carolina
University of Tennessee	Knoxville, Tennessee
Miami University	Oxford, Ohio
Xavier University	Cincinnati, Ohio

## The John Van Range Co.

EQUIPMENT FOR THE PREPARATION AND SERVING OF FOOD

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



# SEDGWICK MACHINE WORKS

Manufacturers of Dumb Waiters and Elevators

156 West 15th Street, New York 11, N. Y.

*The Maximum in Safety . . . The Ultimate in Economy—Since 1893*

Nationwide Representation

## General

Sedgwick Dumb Waiters and Elevators are products of specialization since 1893 in school and college installations throughout the country. Numerous types, sizes and capacities are available to meet different requirements and conditions. The main uses are briefly described below.

## Food Service

Food supplies, dishes, and other cafeteria, lunch room, dining hall and kitchen loads are quickly and conveniently handled from floor to floor by means of SEDGWICK Electric Dumb Waiters or SEDGWICK Hand Power Dumb Waiters, depending on the individual requirements of service frequency, loads to be handled, and height of travel.

## Library Service

Books can be sent without undue effort to the required stack levels or raised from basement storage space as required for distribution by using SEDGWICK Electric Dumb Waiters or SEDGWICK Hand Power Dumb Waiters.

## Classroom Service

Books, stationery, crackers-and-milk lunches and general school supplies are systematically sent up or down by SEDGWICK Dumb Waiters without obstructing stairways with the handling of such loads. Electric or manual operation should be determined according to specific duty required.

## Dormitory Service

Furniture, trunks, laundry hampers and other bulky and heavy loads are carried from floor to floor by SEDGWICK Hand Power Freight Elevators or SEDGWICK Hand Power Dumb Waiters used as trunk lifts.

## Laboratory Service

Supplies and apparatus are safely and easily carried from storage or receiving room to laboratory floors above by SEDGWICK Electric or Hand Power Dumb Waiters conveniently located to save time and effort.

## Laundry Service

Laundry hampers and trucks are carried in many laundry buildings on SEDGWICK Electric Dumb Waiters, SEDGWICK Hand Power Dumb Waiters or Freight Elevators.

## Doors

SEDGWICK Steel Dumb Waiter Doors and Frames are designed to give dependable service in all of the above-mentioned applications. Doors are either bi-parting, single-sliding, or hinged type—and can be built of stainless steel when desired. Approved Underwriters' Labelled construction is followed where called for.

## Infirmiry Service

The Sedgwick Hand Power Hospital Elevator provides an economical and unfailing means of carrying patient on stretcher or bed. Meal trays are handled by SEDGWICK Electric or Hand Power Dumb Waiters.

## Consultation

Our experience gained from many thousands of installations should be used in planning to best advantage installations of dumb waiters and elevators in school and college buildings. Write or telephone us for recommendations, layouts and specifications which will be gladly submitted at once.



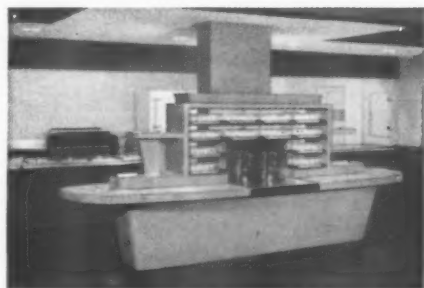
"SEDGWICK Electric Dumb Waiter in Food Service"

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



## BACK *"Home"* IN INDIANA

FORMICA INTERIORS BY  
BURNS & JAMES, Architects  
J. L. SIMMONS CO., Contractors  
BACKUS BROS., Decoration and Furniture



NEW 16 MM COLOR SOUND MOVIE "Living with Formica" pictures uses and how it is made. Available now for group showings. Write for film.

To 15,000 students at Indiana University this dining hall along with dormitories and classrooms, is "home" from September to May.

With a family that size it calls for some pretty practical planning in the matter of building interiors. That's why Formica has figured so prominently in the huge post-war building and remodeling program at this school.

Beautiful, colorful Formica lives well with careless crowds, stays beautiful with only damp cloth cleaning, never needs painting or refinishing. Here at Indiana it's being used on table, desk, and counter tops in dining halls, dormitory rooms, recreation rooms, library, snack bars, lounges and apartment sink tops.

In thousands of outstanding applications calling for lasting beauty in heavy traffic areas, you'll find Formica on the job.

For further Formica information see Sweet's 14a or write Formica  
4533 Spring Grove Ave., Cincinnati 32, O.  $\frac{3}{3}$



"Just as good" is a fable. Look for the label. Insist on genuine Beauty Bonded Formica.



Beauty Bonded

**FORMICA**

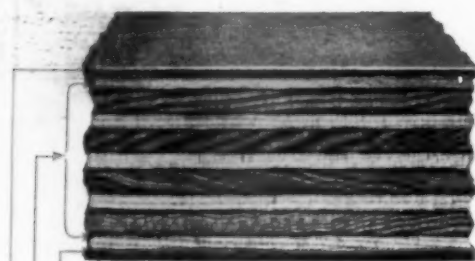
at Home with People  
at Work in Industry

# THE FORMICA CO.

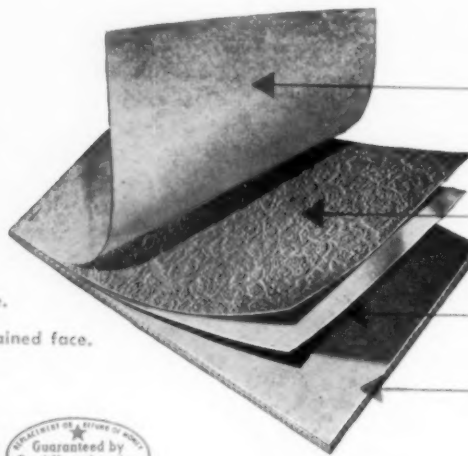
4539 Spring Grove Avenue, Cincinnati 32, Ohio

## What is FORMICA...?

Formica is the registered trade mark for laminated plastics made by The Formica Company, Cincinnati, Ohio, U.S.A. Layers of specially-processed papers are impregnated with synthetic resins. These are cured under intense heat and pressure. The finished product is infusible and insoluble in all ordinary solvents. Formica is unharmed by alcohol, fruit acids, boiling water and ordinary household cleaning alkalies. Its smooth surface will not craze or crack. Minimum maintenance... need never be varnished or painted. Damp cloth cleaning keeps Formica ever



Formica backing sheet to guard against warpage.  
Good quality, laminated plywood with close grained face.  
Beautiful but tough 1/16" thick Formica sheet.



Protective top sheet saturated with Melamine Resin.

Printed decorative sheet saturated with Melamine Resin. In Realwood this layer is a thin veneer of actual wood.

Sheet of metal foil used only in cigarette-proof Formica.

Multi-layer core of strong kraft paper impregnated with Phenol-Formaldehyde Resin. It's tough. Dimensionally stable.

## A few uses for FORMICA



**SINK & CABINET TOPS:** Formica patterns, only, are recommended for these applications. Formica's non-porosity and chemical inertness are ideal here. Won't rot. Colors stay bright regardless of hot, soapy, daily dish water exposure. Withstands temperatures up to 275°F. Fabricators supply Formica tops on plywood, trimmed with metal molding. Simple care and ordinary caution will help maintain Formica's original beauty and enhance its long-lived serviceability.

**BATHROOM VANITY:** This Formica contribution to the beauty and utility of the American bathroom combines the vanity-dresser and the lavatory in one efficient, functional service unit. Easy-to-reach and use storage space is available in the lower part of cabinet units. Even a clothes hamper can be incorporated in the design. A built-in, yet removable waste basket is still another feature. The Vanity makes ultimate use of the space available in new or old bathrooms. Choice of color patterns or combinations is as wide as the Formica line. Beauty and utility are wed in the Vanity... the newest and most practical advancement for better living and use of the bathroom.

**WAINSCOTS & WALLS:** For lasting good looks on walls, it's Formica Beauty Board... (Formica bonded to a hard composition building board). Colors, patterns, Realwoods in 5/16" or 5/32" thickness. Carpenters install easily with metal moldings and mastic on any smooth dry wall. For flush-jointing, Formica veneered on plywood with splined joints, provides the carpenter with easy-to-handle and inviting-to-look-at surfacing material.

**BARS AND COUNTERS:** Alcohol-proof... Cigarette-proof grade Formica is practically mandatory here. For counter tops, Formica is veneered to upper and under surfaces of plywood core. For counter fronts, Formica Beauty Board can be used with metal molding... or Formica veneered to plywood can be butt-jointed.

**STORE FIXTURES:** Since both beauty and utility are incorporated in the one product, Fixture Designers find complete freedom with Formica to design contrasting or matched store interiors of lasting beauty. Merchandise looks its inviting best complemented by Formica. Scurrying shoppers won't scuff it. Clean-up men can't mop away its smooth, lustrous finish.

fresh and new looking. Formica's smooth non-porous surface sheds dirt.

In the case of Formica Realwood, a thin veneer of actual wood is protected by a transparent surface lamination. This makes Realwood as impervious to wear and marring as other decorative Formica, while maintaining all the natural beauty of finely finished selected woods.

Formica comes in thin, tough sheets 1/16" thick... ready to be bonded onto plywood or similar material for use as required.

Formica meets or exceeds all standards established by the National Electrical Manufacturers Association covering laminated thermosetting sheets for decorative purposes.

**BASE BOARDS:** Formed Formica with a wood-core provides the ultimate in basing for walls and display cases. Easily installed by carpenters to fit each job. Durable. Resists both wear and cleaning alkalies. The swishing mop never fazes it.

**DINETTE TABLE TOPS:** It may be of interest to the Designer to know that Formica, the most widely used architectural plastic laminate, is also the leading one for table tops. Nationally advertised furniture lines feature the beauty, utility and durability of Formica to literally millions of family users.

**DESK TOPS:** Dent-proof. Cigarette-proof. Alcohol-proof. And a damp cloth cleans and polishes in one, easy swish. Office furniture gains years of good-looking use with tops of naturally beautiful Formica Realwood or Formica color patterns that blend with the decorative scheme of the office, den or study.

**MAR-PROOF FURNITURE TOPS:** For hotels, hospitals, ships and, yes, the home. Furniture life is longer by years. Maintenance costs are less by dollars and cents, man-hours work and replacement expense. In the livingroom, cigarette-proof Formica invites not only admiration of the guest but also the easy hospitality of the hostess who knows that spilled drinks cannot mar its lustrous surface. In the bedroom, Formica on night-tables is oblivious to water-marks or rings from that bedtime thirst-quencher. Eliminates cosmetic stains from dresser tops. Regardless of where you find Formica on furniture or how you plan to use it, its Beauty Bonded colors, patterns and Realwoods are at home with people, at home or away from home.

**ELEVATOR CABS:** New or modernized, Formica cab interiors keep fresh-looking for years even though in daily, direct contact with the public. No refinishing or repainting. Formica colors and Realwoods last a lifetime... are easy to look at... ever pleasing to touch. Formica is at home with people in elevator cabs.

**DOORS:** Flush type entrance doors and toilet stalls. Can be inlaid with color, patterns or metal decoration or combinations. Long lasting beauty together with ease of maintenance are definite attributes of Formica flush type doors.



THE FORMICA CO. • 4539 SPRING GROVE AVE. • CINCINNATI 32, OHIO

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



# THE ALUMINUM COOKING UTENSIL CO.

Dept. 6250, Wear-Ever Bldg., New Kensington, Pa.



## WEAR-EVER *Aluminum* GAS-FIRED KETTLE

**NEW!**

...no steam used

...completely self-contained

It is the perfect answer where quantities of food have to be prepared and steam is not readily available. Cooking is done by means of gas heat, applied directly to a heavy gauge seamless aluminum shell. The rapidity with which aluminum spreads heat enables the entire container to do the cooking, giving assurance of perfectly prepared foods. Tangent draw-off and easy-to-clean valve give sanitary protection and provide utmost convenience in emptying the kettle. (Kettle insert container also available without draw-off.) One piece hinged cover.

The burner is a Pyrastove burner, specially engineered by the Blodgett Manufacturing Company for use with this kettle. It is light in weight, being approximately  $\frac{1}{3}$  the weight of equivalent cast iron construction. The elimination of cast iron also eliminates breakage, sand holes, porosity, rough interior mixers and headers. Burner tips are of low chrome alloy which resists the kind of corrosion that clogs parts and makes maintenance necessary. Burners turn down to less than 10% of maximum input without flash-back. This permits fuel savings through very low burner adjustments, when only a low temperature is required.

*Wear-Ever also manufactures a complete line of aluminum cooking utensils, steam-jacketed kettles, trays, and other food handling and preparation equipment. Write for further information, telling us the items in which you are particularly interested.*



### DIMENSIONS

19010	19020	19030	19040
10	20	30	40
28 1/2"	32 1/4"	33 3/4"	36 1/16"
25 1/4"	29 3/4"	33 3/4"	35 1/2"
1 1/2"	1 1/2"	1 1/2"	1 1/2"
15 3/4"	15 3/4"	15 3/4"	15 3/4"
3/4"	3/4"	3/4"	3/4"

### SUPERB COOKING RESULTS

This new Gas-Fired Kettle has been thoroughly tested in the Wear-Ever Kitchens and in actual use under everyday restaurant conditions. Excellent results have been obtained as a stock kettle for cooking soups, stews, fresh vegetables, and frozen foods. It also produces excellent roasts. Of unusual interest is the time saved in roasting. For instance, a fresh ham, which normally would have taken 4 hrs. 10 min. in a 350°F. oven took only about half the time (2 hrs. 20 min.) in the Wear-Ever kettle.

**ASK TO HAVE A REPRESENTATIVE CALL ON YOU**

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# CARROM INDUSTRIES, INC.

Ageless Wood Furniture for Dormitories  
Ludington, Michigan



Built for longer life! The room scene shown above (No. 5036) is one of Carrom's five beautifully designed dormitory furniture groupings. Bed, No. 5036; Chest, No. 5432½; hanging mirror, No. 2828; desk, No. 5313; side chair with wood seat, No. 5007W; easy chair with slip cover, No. 5173; bedside table, No. 5005. Top of chest, desk and bedside table and arms of easy chair can be obtained with burn-proof Formica.

## YOUR CHOICE OF 5 CARROM GROUP DESIGNS

Beautifully designed Carrom Dormitory Wood Furniture provides a *warmth* that is so ideal for study and relaxation. Constructed exclusively for institutional use and guaranteed to withstand the hardest usage, it assures outstanding durability. You have a choice of five differently designed groupings and of seven distinctive finishes.

Carrom Wood Furniture is priced with a view to institutional budget requirements. Carrom upholstery, springs and mattresses provide the utmost in comfort and years of trouble-free service.

If you are planning to buy a single piece, or furniture for an entire building, write for Carrom literature now.

**CARROM INDUSTRIES, INC.**

LUDINGTON, MICHIGAN

1950 . . . Our 61st Year

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



## CARROM OFFERS YOU A MONEY-SAVING SERVICE!

If you want an intelligent analysis of wood furniture versus metal . . . or facts on durability, design, finish, construction and upholstery . . . or help in selecting specific types of beds, chairs, dressers and other pieces . . . or someone who can work with your interior decorator or architect to assure you a *real buy* in furniture . . .

**WRITE FOR A CARROM MAN TODAY!**

Catalog S

# SCHOOL and INSTITUTIONAL SEATING

...by NATIONAL



★ SCHOOLS

★ COLLEGES

★ CHURCHES

★ HOSPITALS

★ INSTITUTIONS

★ INDUSTRIAL PLANTS



## NATIONAL STORE FIXTURE Co., INC.

FROM THE FOREST TO THE FINISHED PRODUCT

HOLLINS AND McPHAIL STREETS

BALTIMORE 23, MD.



# NATIONAL TABLES AND C



**No. S-326**

## NATCOLITE **NEVAMAR-TOP TABLE**

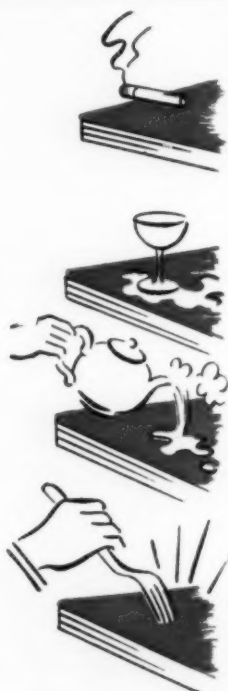
An exceptionally sturdy, well constructed table for every purpose . . . restaurants, industrial cafeterias and institutions. It is built with the genuine NATCOLITE\* lifetime laminated top, 1-3/16 inches thick, and sealed with the shockproof Wynene edge that won't chip, dent or mar. Legs are dressed from 2 1/4 inch stock, with outside edges rounded and tapered. In walnut or harvest wheat finish. Available with tops in choice of ten colors and patterns. A damp cloth keeps it clean and sparkling!

\*NATCOLITE table tops are surfaced with NEVAMAR high-pressure laminates top and bottom.

(Send for sample color chips.)



- CIGARETTE PROOF
- ALCOHOL PROOF
- HEAT RESISTANT
- WON'T CHIP
- WON'T DENT
- WON'T STAIN
- WON'T WARP



**NATCOLITE Tops (without Table Bases) are available for attaching to your present table bases or desks**

# CHAIRS FOR EVERY PURPOSE



## No. S-640 CHAIR

Designed with many exclusive features of construction, this chair will give long, satisfactory service. The seat and back are upholstered in Masland's DURAN, the tough wear-resisting material that is water-proof, alcohol-proof and grease-proof. It will not stain or discolor. Colorful WYNENE welt is used as a superior reinforcement and as an added decorative feature. In No. 37 walnut or harvest wheat finish with upholstery in red, blue, yellow, ivory, chartreuse, green or brown. Seat size 16 x 14½ inches. Shipping weight, 2 to a carton, 25 lbs.

## No. S-643 CHAIR

Here is a chair that is designed to serve every purpose in hotels, restaurants, cafeterias, classrooms, auditoriums and similar uses. It offers the utmost in comfort and durability. Sturdily constructed with a saddle seat and many exclusive NATIONAL features that assure long, satisfactory service.



## No. S-645 JUVENILE



Kindergarten Chair  
Seat height 12 or 14 in.  
In walnut or harvest wheat

**Here Are Some  
of the Firms  
and Institutions  
Now Using**

## NATIONAL SEATING

American Viscose Co.,  
Chester, Pa.  
Aluminum Co. of America,  
Pittsburgh, Pa.  
Bayer Aspirin Co.  
Trenton, N. J.  
Bakelite Corp.,  
Boundbrook, N. J.  
Bethlehem Steel Co.,  
Bethlehem, Pa.  
Bishop Goesbriand Hospital,  
Burlington, Vt.  
Boston Safe Deposit & Trust  
Co.,  
Boston, Mass.  
Bucknell University,  
Lewisburg, Pa.  
Continental Can Co.,  
St. Louis, Mo.  
Crown Cork & Seal Co.,  
Philadelphia, Pa.  
Delaware State Teachers  
College,  
Dover, Del.  
E. I. Dupont De Nemours,  
Wilmington, Del.  
Engineers Mess,  
Ft. Belvoir, Va.  
Johnston Willis Hospital,  
Richmond, Va.  
Lowell Textile Institute,  
Lowell, Mass.  
Loyal Order Moose,  
Williamsport, Pa.  
Lukens Steel,  
Coatesville, Pa.  
Mainland High School,  
Daytona Beach, Fla.  
McPherson College Cafeteria,  
McPherson, Kans.  
Memorial Hospital,  
Noth Conway, N. H.  
University of Delaware,  
Newark, Del. (Dining Hall)  
University of Pennsylvania,  
Phila., Pa. (Dining Hall)  
U. S. Navy Bureau of  
Aeronautics  
Utopia College,  
Eureka, Kansas  
Veeder Root, Inc.,  
Hartford, Conn.  
Walter Reed Hospital,  
Washington, D. C.  
Western Electric Co.,  
St. Louis, Mo.  
Wianno Golf Club,  
Wianno, Mass.  
Wilmington School District,  
Wilmington, Del.  
Yale & Towne Mfg. Co.,  
Philadelphia, Pa.

# Metal Chairs and Tables

## No. S-700 CHAIR



These chairs are constructed of electrically welded tubular steel, triple chrome plated and highly polished. Wynene Sockettes on legs prevent skidding and marring floors. Silent, too—no grating noises when moving chairs.

Upholstery is wear-defying DURAN — just wipe away stains with a damp cloth. WYNENE Lifetime Welt is used as a superior reinforcement and added decorative feature. Seats are 15¾ inches wide, 15 inches deep, double padded for extra resiliency. Comfortable, form fitting backs.

Choice of seven upholstery colors with sockettes to match.

\*Natcolite tops are surfaced with

**NEVAMAR**

High-pressure laminates  
Top and Bottom

NATCOLITE

## NEVAMAR-TOP

PEDESTAL TABLE



**No. S-319X Table**—NATCOLITE\* top with 4" chrome-plated column and pressed steel pedestal base with baked-on crackle finish in black or brown or in black porcelain. Sizes: 30" square or round. No. S-322X — 36" square or round.

## No. S-706 CHAIR

Steel frame, as above



Wood saddle seat; curved plywood back; in walnut or harvest wheat.

**No. S-306X Table**—NATCOLITE\* top with double pedestal base. Sizes 30" by 60" to 36" by 96".





# UNIVERSAL EQUIPMENT COMPANY

Furniture for Schools, Colleges and Libraries

General Offices and Plant: Batesville, Indiana

## TOUGH *and* BEAUTIFUL



*Graceful Dining Room in Oak*

*The amazing new Mirotex finish on Universal dining room, dormitory, lounge, and library furniture will insure years of satisfactory service. Mirotex has withstood every test of ordinary chemicals, acetones, thinners, nail polishes, and polish removers. It is not affected by extremes of temperature, may be washed, and is practically scratch and mar-proof.*



*Dormitory Room in Maple*

Universal is "Mastermade Furniture" providing homelike comfort and harmonious beauty. Backed by over 70 years' experience, all Universal furniture is made of select materials and is of exclusive Thermoweld construction. Our trained staff of technical experts invites your inquiries, for preparing plans and specifications to meet every requirement.

**THE ECONOMY OF QUALITY IS A UNIVERSAL LAW**

# UNIVERSAL

EQUIPMENT COMPANY  
FURNITURE FOR SCHOOLS COLLEGES AND LIBRARIES

A DIVISION OF ROMWEBER INDUSTRIES  
GENERAL OFFICES AND PLANT, BATESVILLE, INDIANA

# SIMMONS COMPANY

Chicago 54, Merchandise Mart  
San Francisco 11, 295 Bay Street

New York 16, One Park Avenue  
Atlanta 1, 353 Jones Avenue, N.W.

## SIMMONS ALL-STEEL DORMITORY FURNITURE

*Attractive . . . Economical . . . Fire-Safe!*



*Added compactness and utility!!!  
Diagonal seating at desk saves space.*

*Dormitory Room No. 146—shown above. Bed, DB-930-SKC;  
Double Desk F-142-21; Chest F-142-4; Chair F-711; Arm chair F-762.*

***Liked by Students! Approved by Administrators!***



**New Double Desk—F-142-21**

Most practical ever designed! Ample for two. Drawer and book space for each student. Large surface, 47½ x 32". Compact design saves space. Saves cost of second desk. Available also with linoleum top. Fits into odd spaces or against walls. Available in standard Simfast finishes.

Simmons furniture is *all-steel*. Years of hard usage do not weaken its structural strength. It withstands usage that would *smash* furniture made of other materials. Drawers in dressers, chests and desks cannot warp or stick. And Simmons construction makes them noiseless!

*Simfast* finishes make Simmons furniture beautiful. They are available in warm, two-tone pastel colors, single color finishes and rich, wood grains. But more important—*Simfast* finishes are highly resistant to the injurious effects of heat, sunlight; the actions of most liquids, hot or cold; chipping, peeling or cracking! That means beauty for years to come with minimum maintenance!

Your nearest Simmons distributor will be happy to help you choose the right pieces for rooms of any size or shape. Ask him to call on you soon, or write Simmons Company

### CONTRACT DIVISION

Display Rooms:

Chicago 54, Merchandise Mart  
San Francisco 11, 295 Bay Street

New York 16, One Park Avenue  
Atlanta 1, 353 Jones Avenue, N. W.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# SIMMONS FURNITURE GROUP No. 142

## Comfortable . . . Durable . . . Sanitary

You will like the variety of pieces available in Simmons Furniture Group No. 142. They enable you to select the furnishings for every room with an eye toward maximum comfort and utility. In addition, the moderate first cost, slow depreciation, and low maintenance expense of the 142

Group make it well worth while to furnish new rooms and re-equip others with pieces from this group. Shown below are a few of the pieces in the 142 Group, together with chairs most frequently selected for dormitory rooms. Write for complete catalog.

**Desk—F-142-6**—Modern table type. Full drawer. Distinctive metal pulls. Available in grain and two-tone finishes. All steel. Top area 34½ x 19 inches.



**Bed—H-353**—Attractive full panel ends. Three-piece construction. SKC ribbon fabric spring. Available in 3/0 or 3/3 width only.



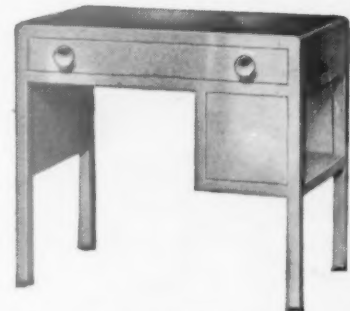
**Dresser—F-142-2**—Medium-sized dresser. Three drawers. Top drawer has center partition. Available in two other sizes (30½ x 19 inches and 44 x 19 inches). In grain and two-tone finishes. Top area 38½ x 19 inches.



**Chair—F-711**—Comfortable modern style. Posture seat and back cushioned in foam rubber. Upholstered in simulated leather in colors.



**Chair—F-762**—Gracefully curved arms. Innerspring seat and back cushions; both removable. Back cushion is reversible. Upholstered in simulated leather in colors. Plastic arm caps.



**Desk—F-142-10**—Student's single model. Open book shelf at right end. All-steel. In grain and two-tone finishes. Top area 34½ x 21 inches.

### Beautyrest MATTRESSES . . . with 10 year guarantee!

Built expressly for schools, hotels and institutions! Beautyrest is famous for comfort and for the years of trouble-free service it gives. That's why more schools, colleges, universities, hotels, and institutions are buying Beautyrest . . . many of them exclusively! In addition, Simmons makes quality mattresses in other price ranges. No matter how much you want to spend for mattresses, you'll be sure of getting your money's worth from Simmons. Ask your Simmons dealer to show you the many quality features of all Simmons mattresses.



THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

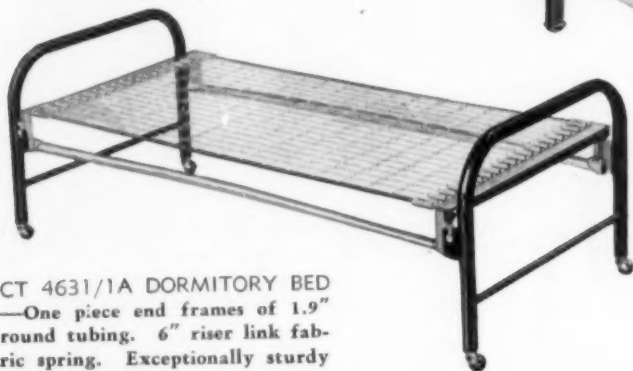


# SUPERIOR SLEEPRITE CORPORATION

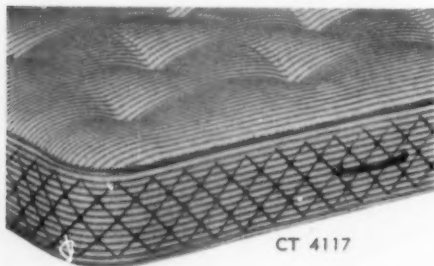
Contract Department, 2219 South Halsted Street, Chicago 8, Ill.



**CT 4650/6A DORMITORY BED**  
—Open panel ends with 1½" square tubing, round cornered frame. 6" riser slat band spring. Over-all height, 22½"; spring height, including rubber cushioned glides, 16"; width, 3/3. Solid color or wood grain Vitarite finishes.



**CT 4631/1A DORMITORY BED**  
—One piece end frames of 1.9" round tubing. 6" riser link fabric spring. Exceptionally sturdy and serviceable. Over-all height, 27", including 2" casters; fabric height, 16"; inside length, 75"; width, 3/0. Brown finish.



CT 4117

**CT 4117 INNERSPRING MATTRESS**—Genuine inner-roll construction; 231 coils (4/6). Sisal pad insulation, white layer-cotton felt upholstery. 6-1/5 oz. A.C.A. cover, Droll border. Plastic handles, ventilators. 3/0 or 3/3.

**HOTEL SPECIAL INNERSPRING MATTRESS**—Deluxe 312 coil unit. Sisal pad insulation; all white layer-cotton-felt upholstery. 1300-grade, woven stripe cover. Channel border, plastic handles and ventilators. Full inner-roll construction. 3/3 or 4/6 sizes.

**CT 2650/6 CONVERTIBLE DOUBLE BUNK BED**—1½" square tubing and open panel ends lend rugged strength and beauty to this double bunk bed that is readily converted for twin use. Riser slat band springs with heavy side rails of cambered oval tubing give extra rigidity. Over-all height, 62"; bottom spring height, 16"; top spring height, 53"; inside length, 75"; width, 3/0. Available in solid color or wood grain Vitarite finishes.

CT 2650/6

**All Metal Products  
Available in Finishes to Match  
Sleeprite Case  
Pieces**



CT 4650/6A



**CT 4306 CHAIR**—Smartly designed in 1-3/16" square tubing with seat and back upholstered in Naugahyde. Height, 34"; seat, 17½" x 17".

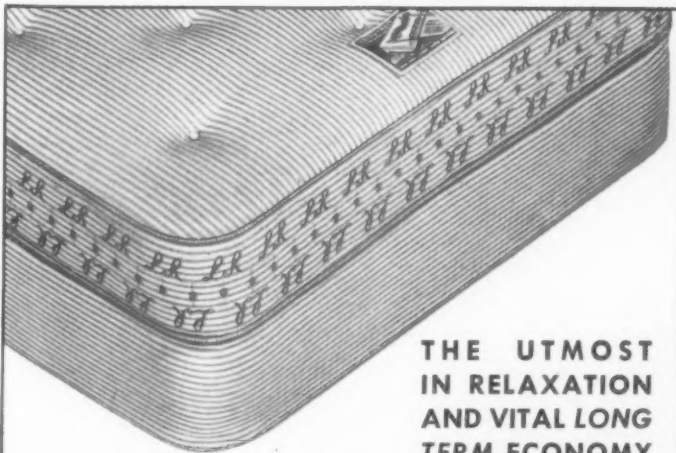


TO LIVE RIGHT... *Sleeprite*

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



## Combine Comfort with Close Budget Control for Staff Quarters



**THE UTMOST  
IN RELAXATION  
AND VITAL LONG  
TERM ECONOMY**

SUPERIOR SLEEPRITE mattresses in every price bracket represent high value. Supreme above all, however, is LEVEL-REST. Designed to permit thorough relaxation and to encourage healthful "sleep posture," LEVEL-REST is constructed of materials that assure long and satisfactory use. Write for detailed Mattress brochure.

Added to the important consideration of low up-keep cost, characteristic of all of SUPERIOR's fine metal furnishings, is the factor of minimum initial investment consistent with quality materials and construction. The CT 135 is scaled for utilization of modest space allotments, too.

Pictured above are: Double dresser No. CT 135/2 (shown with 28" x 48" hanging mirror); single 3-drawer dresser No. CT 135/1; conventional bed No. CT 135/10; Chest-O-Bed No. CT 135/56; night stand No. CT 135/5; desk No. CT 135/8.

The Chest-O-Bed is equipped with special coil-spring which accommodates the chest-of-drawers built-in feature without extra floor area.

\*VITARITE

Trade Mark Reg. U. S. Pat. Off.

**PLEASE ADDRESS INQUIRIES TO: CONTRACT DIVISION  
SUPERIOR SLEEPRITE CORP., 2219 SOUTH HALSTED ST., CHICAGO 8, ILL.**

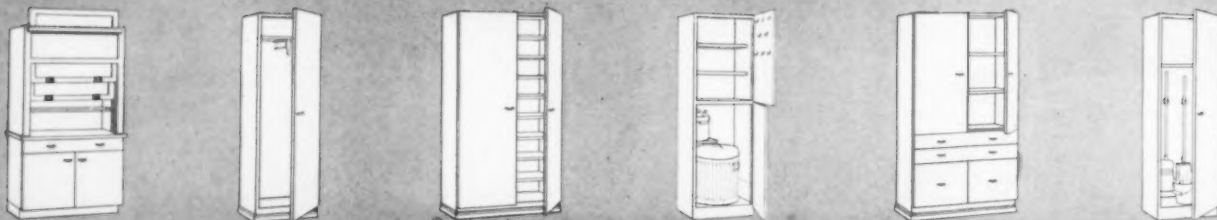
THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# KEWAUNEE MANUFACTURING COMPANY

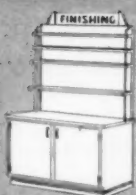
Adrian, Michigan

REPRESENTATIVES AND SALES OFFICES IN PRINCIPAL CITIES

## HOME-MAKING FURNITURE



Above and at right are just a few of the many cabinets which have been designed to withstand rough usage encountered in schools and universities. A more complete selection can be found in our Home-Making equipment catalog. This catalog also contains suggestive floor plan and room layouts and follows recommendations of experts in this field. Cabinets shown are standard catalog items which can be furnished at moderate cost. Custom or specially constructed units are available. However small the deviation from a standard unit, the cost of the change is important in time, engineering and materials. It is to your advantage to adapt standard units to your needs wherever possible.



## INDUSTRIAL ARTS EQUIPMENT

Shown above are a few items of Industrial Arts Equipment which have been designed to meet specific needs of each different Industrial Art subject. Our design engineers consulted many prominent instructors in Schools and Colleges throughout the country in order that we might give you equipment designed to meet the needs of the future. Sizes and shapes of cupboards and drawer storage requirements were found to be very important and, of course, we have conformed to these findings. Equally important were the opinions on construction and

materials. Therefore, you may look for and find in Kewaunee Built Equipment the quality desired from every standpoint. This type of equipment may be built of wood or steel or both, depending upon which one we feel will give you the most durability and yet be economical in initial cost and maintenance upkeep. Write today for your personal copy of Kewaunee Industrial Arts Catalog, or write stating your requirements and we shall be pleased to have one of our sales engineers call on you at your convenience. You will not be obligated in any way.



The four drawings below are taken from our catalog entitled Kewaunee Scientific Laboratory Equipment for Secondary Schools and Junior Colleges. In this catalog are several pages of laboratory room layouts; in addition you will find a multitude of

illustrations showing items of equipment to meet practically every laboratory need. Hardwood construction is used predominantly in the manufacture of this equipment.

### EDUCATIONAL LABORATORY EQUIPMENT

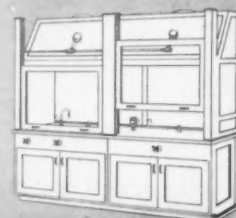
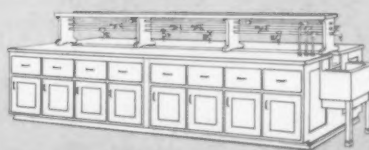
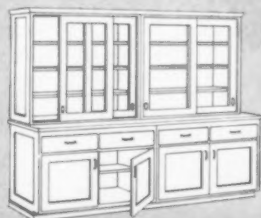
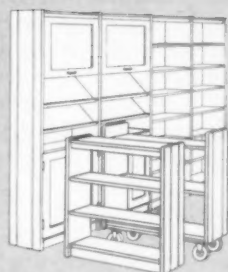


Photo at left is of an installation of Kewaunee metal equipment. This is a General Chemistry Laboratory. Notice the neat, orderly room layout providing ample space for students to perform their assignments.

In Kewaunee's Catalog No. 50 you will find several sections devoted exclusively to Educational Laboratory Equipment in metal. In Universities and Colleges there is a definite trend and need for equipment that will bridge the gap between the type of equipment used in High Schools and that which is found in our highly specialized industrial laboratories. Kewaunee engineered equipment most decidedly fills this gap as is evidenced by our ever growing list of installations. A copy of this catalog will be sent upon request.



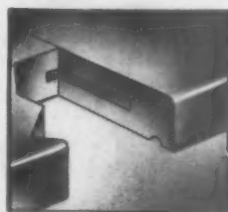
At left are shown several items from our comprehensive library line of furniture. Construction is primarily of choice seasoned hardwoods. Its design is smart in taste, one which is modern and yet not one to be outdated in a few years, and further providing furniture which is not excessively high in cost.

### LIBRARY FURNITURE



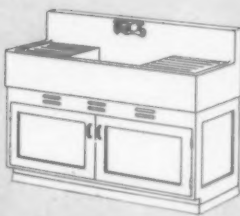
The exhibit case shown here is merely a typical standard. The special nature of exhibition cases prohibits more than a few basic standard types. Therefore, we have designers available to provide casework that will meet your specific requirements. Our exhibit case folder is available upon request.

### EXHIBIT DISPLAY CASES



Kemrock, a Kewaunee exclusive. This working surface material is phenomenal in its resistance to acids, alkalis and solvents. A comprehensive folder describing more fully Kemrock's physical properties will be forwarded upon request.

### KEMROCK SURFACES



Kemtherm Sinks, a Kewaunee exclusive, are a one-piece cast chemical stoneware unit with a resinous baked finish highly resistant to chemical attacks. It withstands thermal shock, i.e., alternate filling with boiling water and ice water. Send for a Kemtherm Sink folder containing complete information.

### KEMTHERM SINKS

# BAVINCO MANUFACTURING CORPORATION

400 Scajaquada St. Buffalo 11, N. Y.

Manufacturers of a Complete Line of Homemaking Equipment  
for Schools and Universities

## RECENT INSTALLATIONS ARE NATIONWIDE

Hunter College  
Brooklyn College  
University of New York  
Skidmore College  
Villa Maria Academy  
Stephens College  
Christian College  
Briar Cliff College  
Adelphi College  
Lourdes Academy  
Keene Teachers College  
Central Missouri  
Simmons College  
Florence St. Teachers Coll.  
Samuel Hoston College  
Western Illinois St. Coll.  
Northwestern State College  
University of Vermont  
University of Oklahoma  
University of Tulsa  
University of Nebraska  
University of Maryland  
University of Georgia  
University of Alabama  
University of Omaha

Kenmore Sr. High School  
Kenmore, New York  
Blodgett Vocational H. S.  
Syracuse, New York  
Donora Jr. High School  
Donora, Pa.  
Monessen High School  
Monessen, Pa.  
Euclid Sr. High School  
Euclid, Ohio  
Holy Name High School  
Cleveland, Ohio  
Our Lady of Lourdes H. S.  
Cleveland, Ohio  
Sophie Wright H. S.  
New Orleans, La.  
John McDonough H. S.  
New Orleans, La.  
Madison St. H.  
Alexandria, Va.  
Douglas High School  
Baltimore, Md.  
Forest Park High School  
Baltimore, Md.  
Tracy Union H. S.  
Tracy, Calif.  
Central Catholic H. S.  
Great Falls, Mont.  
Dasher High School  
Valdosta, Ga.  
Sylvan Hills H. S.  
Atlanta, Ga.  
Milwood Jr. High School  
Kalamazoo, Mich.  
Pine Knott High School  
Pine Knott, Ky.  
Waltham High School  
Waltham, Mass.  
Oak Ridge High School  
Oak Ridge, Tenn.  
Beloit Sr. High School  
Beloit, Wis.  
Wauchula High School  
Wauchula, Fla.  
Iowa University H. S.  
Iowa City, Iowa  
Hennepin Twp. H. S.  
Hennepin, Ill.  
Tarkio High School  
Tarkio, Mo.  
Whiteface High School  
Whiteface, Texas  
Tidehaven High School  
Blossing, Texas



THIS IS THE KITCHEN  
I WANT IN MY  
HOMEMAKING DEPARTMENT



## HOMEMAKING EQUIPMENT that More and More Schools Prefer!

Planning a new Homemaking Department . . . or thinking of modernization? Then be sure to see what Bavinco has to offer you! Years of research and study with the nation's foremost educators, combined with precision construction methods, have earned for Bavinco the position of unchallenged leadership in this field. Bavinco manufactures a complete line of equipment for all types and combinations of Homemaking Departments. Each unit affords maximum flexibility of use to meet the requirements of any curriculum. Authentic, modern home atmosphere is designed and built into each Bavinco installation. Thus you can be sure of approved home surroundings in the classroom for greatest teaching efficiency.



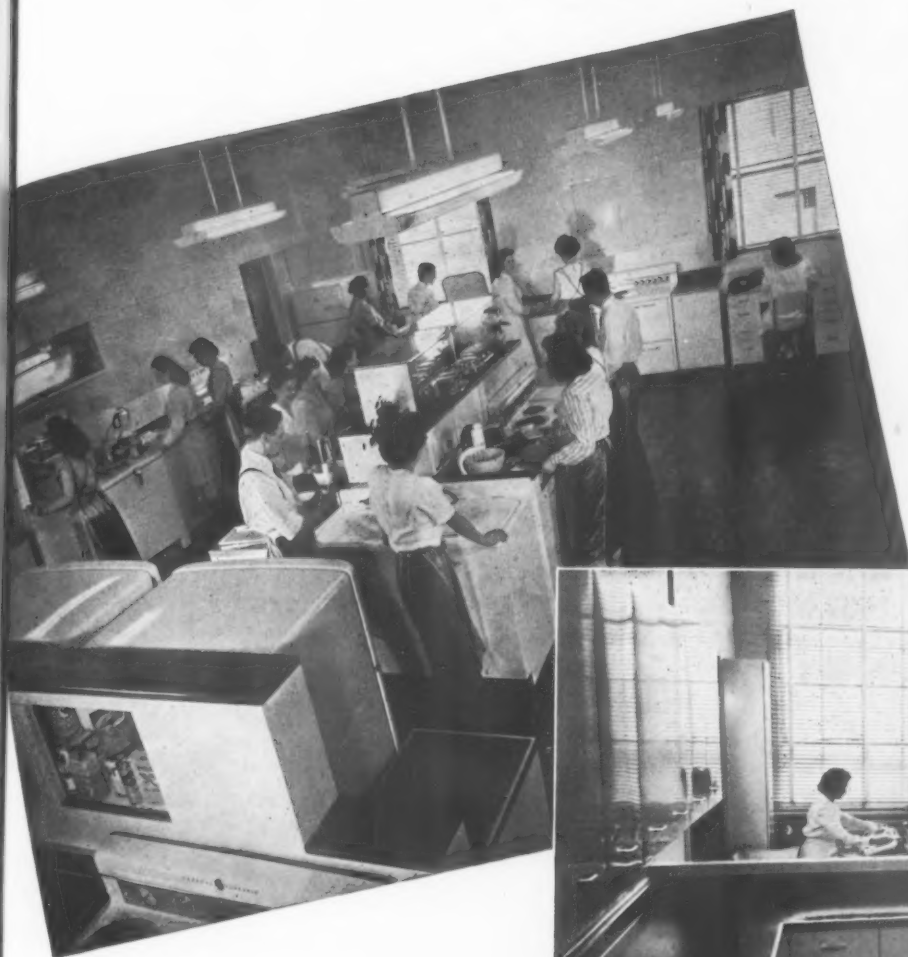
### FREE PLANS

Available to architects and school administrators. Qualified school planners will layout the most satisfactory solution to your individual equipment needs. Skilled engineers will draft these recommendations into complete detailed drawings. Be sure to ask for this helpful planning service. No obligation.

### FREE CATALOG . . . ALSO AVAILABLE!

Fully illustrated catalog shows the complete Bavinco line of homemaking equipment for the foods room, clothing room and general utility equipment, together with floor plans and typical installations.

# GENERAL ELECTRIC EQUIPS THE MODERN HOMEMAKING DEPARTMENT



In the training laboratories of the General Electric Consumers Institute, trainees receive thorough instruction in the use of modern all-electric kitchen and laundry equipment.



The Consumers Institute staff of experts use electric appliances just as they are used in the home and in the classroom. They pass along new and improved laundry methods — new methods of food preparation and preservation.

## GENERAL ELECTRIC COMPANY

APPLIANCE AND MERCHANDISE DEPARTMENT

BRIDGEPORT 2, CONNECTICUT







# EFFECTIVE PLANNING OF THE



At Bristol High, a G-E clothes dryer enables students to do the complete drying job—indoors.

From washer to dryer to rotary ironer—all the steps in modern home laundering are learned with G-E home laundry equipment.

The home economics course is not new to our schools and universities, but 'new' is certainly the word for this 'classroom' pictured on these pages. The Home Economics Department of the Bristol High School, Bristol, Pa., in conjunction with the Home Bureau of the General Electric Company and its distributor and retailer, has designed the most modern of kitchen-laundry classrooms.

Home economics educators agree that homemaking can best be learned by the students with the modern equipment that they may expect to have when they acquire homes of their own. New time- and laborsaving appliances mean new time- and laborsaving techniques. In Bristol, effectively arranged, well-designed home economics kitchen and laundry, students learn through actual practice the art of modern homemaking.

The equipment shown includes the General Electric Freezer, Stratoliner Range, with pressure cooker; the Electric Sink, which includes the Automatic Dishwasher and Disposall®; Refrigerator; and Storage Cabinets. The laundry equipment includes the G-E conventional Washer, Dryer, and Rotary Ironer.

The Home Economics Department at Bristol High is a new addition to the school's curriculum. It has received enthusiastic support from the students; more than 100 are enrolled. Bristol sets a fine example of what can be done around such a nucleus as this kitchen-laundry. In addition to the usual home economics course and its practical application, Bristol High has included a sewing section, a dining section, and a personal grooming section. Learning can be fun with equipment such as this.

\*Reg. U.S. Pat. Off.



# THE CLASSROOM KITCHEN AND LAUNDRY



One Bristol High School student operates the G-E Mixer while another bakes in the G-E Stratoliner Range. In the background can be seen the Electric Sink, combining the Disposall and

Automatic Dishwasher. On the right is the G-E Home Freezer. Bright window draperies and green Textolite® plastic counter tops make this kitchen-laundry a joy to "study" in.

\*Reg. U.S. Pat. Off.

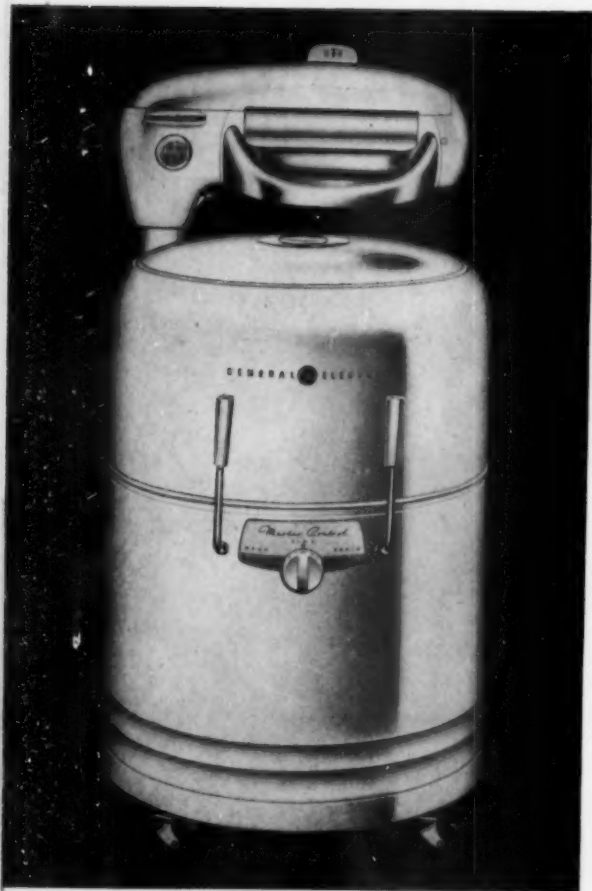
The Bristol High kitchen and laundry is designed around the "work center" principle as advocated by the Home Bureau of the General Electric Company. Under this system, the various kitchen-laundry activities are centered around the appliance to be used. These centers are the food storage center, the food preparation center, the dishwashing center, and the laundry center. The whole purpose of this principle is to save unnecessary effort. For instance, all the materials for food preservations, such as storage containers, waxed paper,

aluminum foil, are to be found in the cabinets adjacent to the refrigerator. And again, at the food preparation center, all the materials, such as flour, condiments, and the mixer, are stored. Students learn economy of time and motion as well as economy of modern homemaking.

On the following pages, General Electric's special sales plans for educational institutions are outlined. Also given are descriptions of some of the many products that will be useful in successful training of the homemakers of tomorrow.



# FINE APPLIANCES FOR



## ◀ GENERAL ELECTRIC WRINGER WASHER

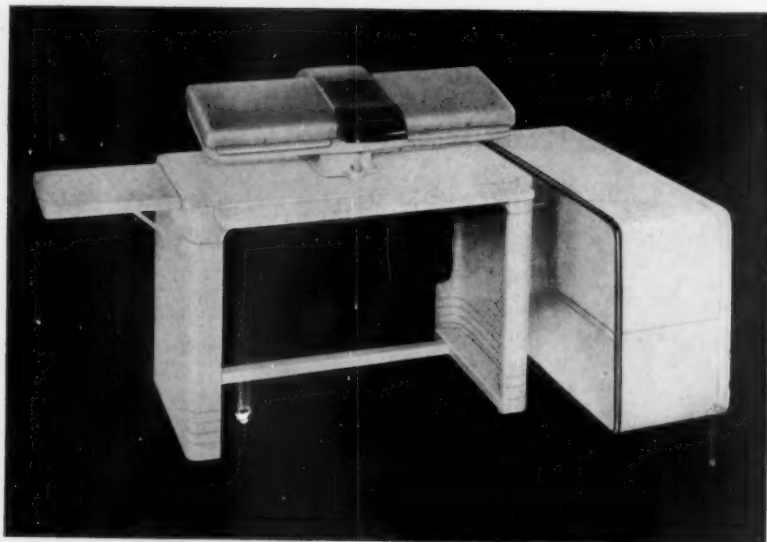
The G-E Wringer Washer features the Activator\* washing action — famous for "quick-clean" washing. The one-control wringer can be adjusted for every fabric, and locks in eight different positions. The Perma-drive mechanism gives a long, economical life.

The simple operation of the Wringer Washer aids in demonstrations in classroom work. \*Trade-mark Reg. U. S. Pat. Off.

## GENERAL ELECTRIC AUTOMATIC WASHER ▶

This is the famous All-Automatic washer that gives a complete automatic cycle — soak, wash, rinse, and spin-dry. The controls can be turned forward or backward at any time . . . anyone can operate it. At the end of the spin-dry period, many articles are dry enough to iron.

A five-year protection plan on the sealed-in driving mechanism makes the General Electric All-Automatic Washer a sound school investment.



## GENERAL ELECTRIC FLATPLATE IRONER

The G-E Flatplate Ironer makes quick work of any ironing because of the large ironing area (300 square inches) and the automatically applied pressure (400 pounds). It will turn out two flat pieces at a time, and the operator can iron as fast — or as slow — as she wants.

Automatic temperature control for every kind of fabric. The ironer is ideal for pressing, too.



## G-E AUTOMATIC TUMBLER DRYER

This automatic tumbler dryer is especially valuable for classroom work because it dries clothes indoors — eliminating the need for clotheslines and the hanging of clothes. It damp-dries the average washer load ready for ironing in 30 minutes or less, and completely dries clothes ready for folding in 60 minutes or less. Holds a full washer load of clothes (about eight pounds).



# FINE HOMEMAKING CLASSROOMS



## NF-10 REFRIGERATOR

General Electric Space Maker Refrigerators provide up to one-third more refrigerated storage space in almost exactly the same floor space as that occupied by previous eight-cubic-foot models. The de luxe ten-cubic-foot Space Maker illustrated (Model NF-10) has many special timesaving, laborsaving convenience features, which have been tested for practical utility in the General Electric Consumers Institute kitchen. G-E Refrigerators are cooled by the famous General Electric sealed-in refrigerated system, which gives dependability and low operating costs. G-E refrigerators are available in a variety of sizes and models to meet the needs of all home economics kitchens.



## NA-8 HOME FREEZER

General Electric Home Freezers have a temperature range of zero F to 10 F, and are cooled by the same type of sealed-in refrigerating system as that used in G-E Refrigerators. G-E Home Freezers are available in two sizes . . . the eight-cubic-foot model illustrated (NA-8), which holds up to 280 pounds of frozen food, and a four-cubic-foot model (NA-4) which holds up to 140 pounds. Both models have a counterbalanced lid, an automatic interior light, and are equipped with wire storage baskets for easy accessibility and segregation of foods.

## NH-8 REFRIGERATOR-HOME FREEZER COMBINATION

The combined advantages of a General Electric Refrigerator and Home Freezer are offered by this advanced model, in one cabinet! The Freezer section is separately refrigerated and insulated. It holds up to 53 pounds of frozen food, and maintains zero F, giving you full use as a home freezer. Its separate door prevents "cold waste" in the freezer when the fresh-food door is opened. The fresh-food section holds as much as the average eight-cubic-foot model. Its high relative humidity lets you store food uncovered . . . and you never need defrost the lower section! This model can be had in a ten-cubic-foot size (NH-10) that holds 70 pounds of frozen food and as much fresh food as an average ten-foot model.

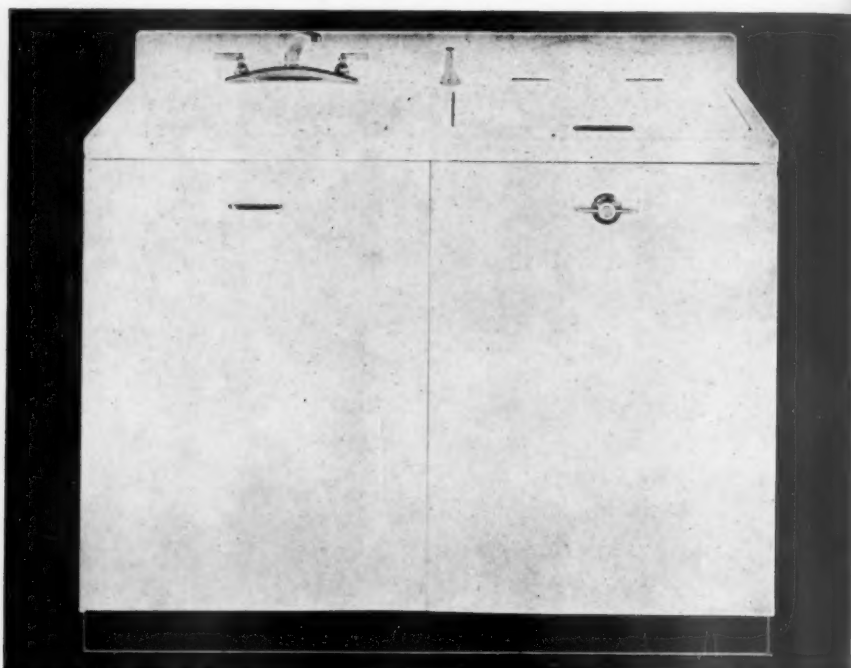


# ELECTRICAL EFFICIENCY FOR



## G-E AUTOMATIC DISHWASHER

The Automatic Dishwasher takes up to 100 pieces. It washes and twice rinses dishes—uses water hotter than the hands can stand. When dishes are washed and rinsed, the machine turns off automatically, and the cover rises to allow dishes to dry.



## THE GENERAL ELECTRIC AUTOMATIC ELECTRIC SINK

Includes the Automatic Dishwasher and the remarkable G-E Disposall in a single, attractive unit. The Dishwasher washes and twice rinses dishes, cutlery, pots and pans in a few minutes. Then the machine automatically stops, and the cover rises to allow the dishes to dry. The Disposall shreds and flushes all fresh-food waste down the drain.

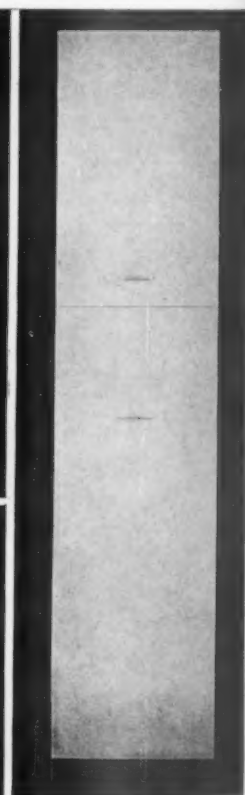
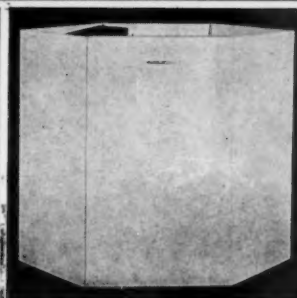


## THE GENERAL ELECTRIC DISPOSALL®

The Disposall is installed in the sink drain. It shreds the food waste into tiny particles and flushes them down the drain.

## GENERAL ELECTRIC STORAGE CABINETS

These cabinets are precision-built of heavy-gage sheet steel with welded construction for strength and rigidity. Easily installed. Attractive in appearance and most convenient in use. General Electric wall cabinets can be wired for interior lighting.



# OR MODERN HOMEMAKING CLASSES



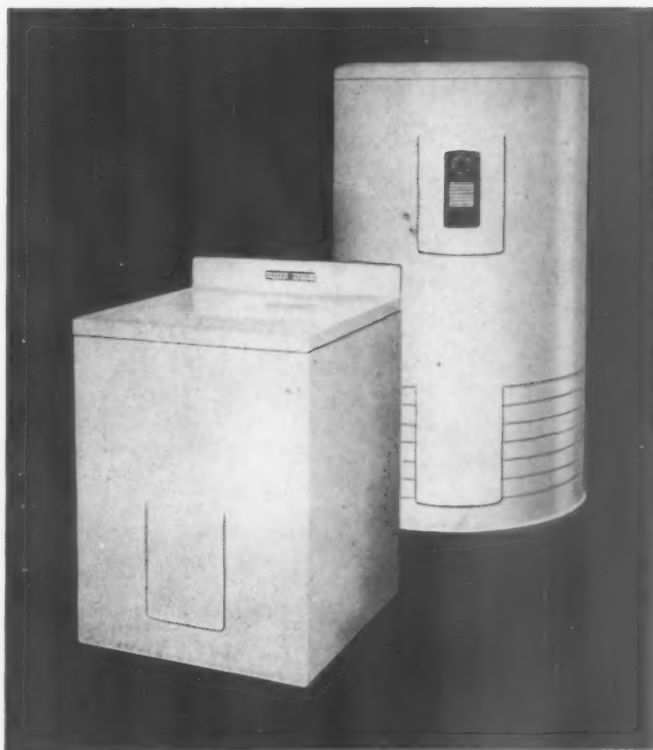
## G-E AUTOMATIC ELECTRIC RANGE

The Stratoliner—new “push-button” range. Push a button—a Tel-A-Cook light comes on—one for each cooking speed. Built-in Pressure Cooker. Six-quart size, safety-type, inside sealing lid. Raisable Calrod\* unit can be used as fourth cooking surface unit. Has Tripl-Oven, Master Oven, Super Broiler. Automatic Oven Minder for oven cooking and Minute Minder for surface cooking.

\*Trade-mark Reg. U.S. Pat. Off.

## G-E AUTOMATIC ELECTRIC WATER HEATERS

The General Electric Automatic Electric Water Heater provides clean, hot water with a minimum of care. The famous G-E Calrod heat-wrap unit gives hot water at a constant temperature. It's safe, too, . . . no flames, no fumes, no smoke . . . It can be installed anywhere. Available in both round and table top models.



## G-E STUDIO MODEL

If space is limited, here's the answer for increased cooking capacity in small classrooms. The Studio has many of the features found on standard-sized ranges, including the large oven and Calrod cooking units.



## ED1-F LIBERATOR RANGE

Extra capacity . . . in the new G-E Liberator Range featuring two ovens . . . Master Oven and Companion Oven . . . both fully equipped for baking, roasting, and broiling.





# HANDY, SMALL APPLIANCES



**THE G-E PORTABLE MIXER** zips through troublesome meal-preparing tasks in a jiffy. Three-beater construction for thorough and uniform mixing. Built-in light illuminates bowls. Complete with large bowl, small bowl, and juice extractor.



**THE G-E AUTOMATIC COFFEE MAKER** brews full-flavored, delicious coffee—automatically. Simply press a button—water heats, coffee brews, coffee keeps piping hot, automatically.



**THE G-E AUTOMATIC ROASTER** cooks a complete meal for six to eight people. Fully automatic, it bakes, toasts, fries, and steams. Holds a 20-pound turkey. Three-piece utensil set. Temperature range from 150 to 500 degrees F.

**THE G-E STEAM IRON** converts from steam to dry ironing by merely twisting the control knob. Fabric-Dial controls soleplate temperature.



ES

# FOR MODERN HOMEMAKING



**G-E KITCHEN CLOCKS** are split-second accurate. Available in several beautiful colors to harmonize with any decorations.

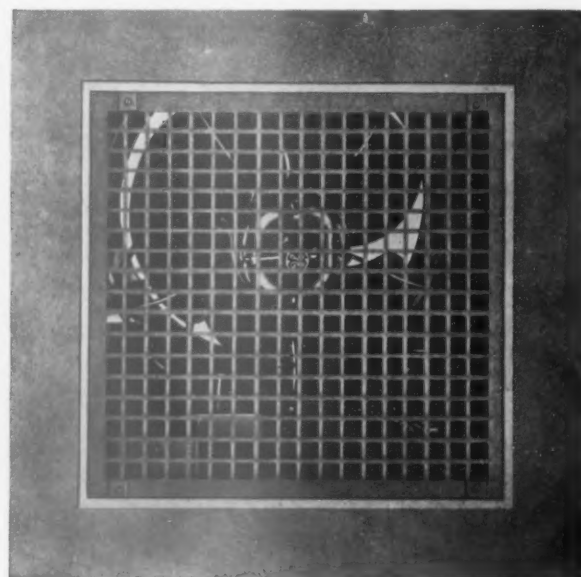


**THE G-E SANDWICH GRILL** toasts, grills, and fries foods, right at the table. Quick-heating nickel-chromium heating unit. Equipped with interchangeable sandwich grids and waffle grids.



**THE G-E AUTOMATIC TOASTER** pops toast up or keeps it warm until you're ready for it. Makes toast any degree of brownness.

**G-E VENTILATING FANS** swiftly remove hot, stale air, and make the kitchen airy and pleasant. Available in window or wall cabinet models.



## **HERE'S GENERAL ELECTRIC'S PLAN TO HELP SCHOOLS HAVE THE NEWEST APPLIANCES FOR TEACHING PURPOSES**

Under General Electric's plan for sales to educational institutions, home economics departments can have the latest models of General Electric refrigerators, home freezers, ranges, water heaters, dishwashers, Disposalls, kitchen cabinet equipment, and home laundry equipment for instructional purposes. These appliances are available at special, low prices, offered only to schools buying for teaching purposes. New models will be substituted for those in use as quickly as major developments make the change desirable.

For the convenience of buyers of electric equipment, sales contacts with educational institutions will be maintained by General Electric appliance distributors and dealers, and all sales should be made through these organizations.

Educational institutions in the immediate neighborhood of a distributor's headquarters, where service could be provided by the distributor, may deal direct with the distributor's organization. Those at a greater distance, which could be served better by a dealer, will be contacted by the local retail outlet.

The simple agreement, stating the convenient conditions on which the plan is operated, is reproduced on the opposite page. Read it carefully.

---



**GENERAL ELECTRIC  
APPLIANCE INSTALLATION AGREEMENT  
WITH EDUCATIONAL INSTITUTIONS**

An agreement to install General Electric Household Appliances in Domestic Science and Home

Economics Departments of Educational Institutions for instructional purposes.

**THIS AGREEMENT IS MADE BY AND BETWEEN**

(Dealer or Distributor)

(City)

(State)

And

(Educational Institution)

(City)

(State)

The dealer or distributor agrees to sell and the Educational Institution agrees to buy General

Electric Household Appliances at a special accredited Educational Institution price as follows:

**QUANTITY**

**PRODUCT**

**MODEL**

**PRICE**

The above price includes delivery and installation to existing wiring and plumbing, but if special wiring and plumbing are required, it must be done at the expense of the Educational Institution. The price also includes any service required to maintain the above-described appliances in good operating condition for one year, except for repairs caused by breakage or replacement due to negligence of the user.

The Educational Institution agrees that the appliances covered by this agreement are to be used only for instructional purposes in Domestic Science or Home Economics Departments.

If the Educational Institution is legally entitled to purchase, on a tax-free basis, products subject to a Federal Excise Tax, the dealer or distributor will, upon receipt from the Educational Institution of the original copy of a properly executed Federal Excise Tax Exemption Certificate as required by the Bureau of Internal Revenue, submit the certificate through the usual channels to the manufacturer. Any resulting tax credits will be refunded to the school.

The distributor or dealer further agrees that he will replace the above-described appliances with comparable new models as they are released when, in the opinion of the manufacturer, changes in new models are of sufficient difference and importance to warrant it. The replacement will be made at no additional cost to the Educational Institution, provided the above-described appliances are in good condition, normal wear and tear excepted. Any

additional wiring or plumbing expense involved in connection with the replacement will be paid by the Educational Institution.

The Educational Institution shall be responsible for normal care of appliances installed under this agreement, and agrees that upon replacement, possession of and title to the General Electric Appliances so replaced will revert to the dealer or distributor.

If, for any reason, the Educational Institution should desire to have a larger or more de luxe type of product than they have been using, it is agreed that they will pay the difference between the price of the product installed in the Educational Institution and the special accredited Educational Institution price of the higher-priced product.

If, for any reason, the dealer or distributor is unable to secure replacement appliances through regular channels of distribution, and he is prevented from replacing the appliances already installed in the Educational Institution, then no liability will accrue therefor. The dealer or distributor agrees, however, to make such installations or replacements in the manner specified as soon thereafter as is practicable, excepting that if he is no longer franchised to handle General Electric Appliances the agreement becomes inoperative.

This agreement is subject to annual renewal with the mutual consent of the Educational Institution and the dealer or distributor.

SIGNED:

(Dealer or Distributor)

By

(Title)

Date

(Educational Institution)

By

(Title)

Date



# THE FINEST ELECTRIC EQUIPMENT FOR THE HOMEMAKING DEPARTMENT

Keep in contact with your local General Electric appliance distributor for information and advice in planning and revising your home economics classrooms. He will be glad to keep you advised of the

availability of appliances and their exact specifications. For your convenience, here is a list of the major General Electric appliance distributors:

<i>City and State</i>	<i>Distributor</i>
Albany, N. Y. ....	A. Wayne Merriam, Inc.
Albuquerque, New Mexico .....	Electric Supply Company
Allentown, Pa. ....	General Electric Supply Corp.
Atlanta, Ga. ....	W. D. Alexander Co.
Baltimore, Md. ....	General Electric Supply Corp.
Birmingham, Ala. ....	Matthews Elec. Supply Co., Inc.
Bloomfield, N. J. ....	General Electric Appliances, Inc.
Boston, Mass. ....	General Electric Appliances, Inc.
Boston, Mass. ....	General Electric Supply Corp.
Buffalo, N. Y. ....	General Electric Supply Corp.
Butte, Mont. ....	General Electric Supply Corp.
Charleston, W. Va. ....	Virginian Electric, Inc.
Chicago, Ill. ....	R. Cooper, Jr., Inc.
Cincinnati, Ohio ....	General Electric Appliances, Inc.
Cleveland, Ohio ....	General Electric Supply Corp.
Columbia, S. C. ....	Perry-Mann Electric Co., Inc.
Columbus, Ohio ....	Bard, Inc.
Dallas, Texas ....	General Electric Supply Corp.
Denver, Colo. ....	B. K. Sweeney Co.
Detroit, Mich. ....	General Electric Supply Corp.
Dubuque, Iowa ....	Crescent Electric Supply Co.
Fargo, N. Dakota ....	Dakota Electric Supply Co.
Fresno, Calif. ....	Valley Electric Supply Co.
Hartford, Conn. ....	Orkil, Inc.
Honolulu, T. H. ....	W. A. Ramsay, Ltd.
Houston, Texas ....	General Electric Supply Corp.
Indiana, Pa. ....	Whiteman Div., National Mine Service Co.
Indianapolis, Ind. ....	Electric Appliances, Inc.
Jacksonville, Fla. ....	General Electric Appliances, Inc.
Kansas City, Mo. ....	General Electric Supply Corp.
Lancaster, Pa. ....	Raub Supply Co.

<i>City and State</i>	<i>Distributor</i>
Little Rock, Ark. ....	O'Bannon Bros.
Los Angeles, Calif. ....	General Electric Appliances, Inc.
Louisville, Ky. ....	General Electric Supply Corp.
Mankato, Minn. ....	Southern Minnesota Supply Co.
Milwaukee, Wis. ....	E. H. Schaefer Corp.
Nashville, Tenn. ....	General Electric Supply Corp.
New Orleans, La. ....	General Electric Supply Corp.
New York, N. Y. ....	General Electric Appliances, Inc.
Oklahoma City, Okla. ....	General Electric Supply Corp.
Omaha, Nebraska ....	General Electric Supply Corp.
Philadelphia, Pa. ....	General Electric Appliances, Inc.
Phoenix, Ariz. ....	Arizona Wholesale Supply Co., Inc.
Pittsburgh, Pa. ....	General Electric Appliances, Inc.
Portland, Oregon ....	General Electric Supply Corp.
Poughkeepsie, N. Y. ....	Electra Supply Co., Inc.
Providence, R. I. ....	E. Pulver Cook, Inc.
Raleigh, N. C. ....	Walker-Martin, Inc.
Richmond, Va. ....	R. S. Montgomery, Inc.
St. Louis, Mo. ....	General Electric Appliances, Inc.
St. Paul, Minn. ....	General Electric Supply Corp.
Salt Lake City, Utah ....	General Electric Supply Corp.
San Francisco, Calif. ....	General Electric Supply Corp.
Seattle, Wash. ....	General Electric Supply Corp.
South Bend, Ind. ....	South Bend Electric Co., Inc.
Syracuse, N. Y. ....	Gould-Farmer Co., Inc.
Tampa, Fla. ....	General Electric Appliances, Inc.
Terre Haute, Ind. ....	Advance Electric Co.
Toledo, Ohio ....	Commercial Electric Co.
Utica, N. Y. ....	Langdon & Hughes Electric Co.
Washington, D. C. ....	General Electric Supply Corp.
Williamsport, Pa. ....	Lowry Electric Supply Corp.
Worcester, Mass. ....	Coghlin Electric Co.

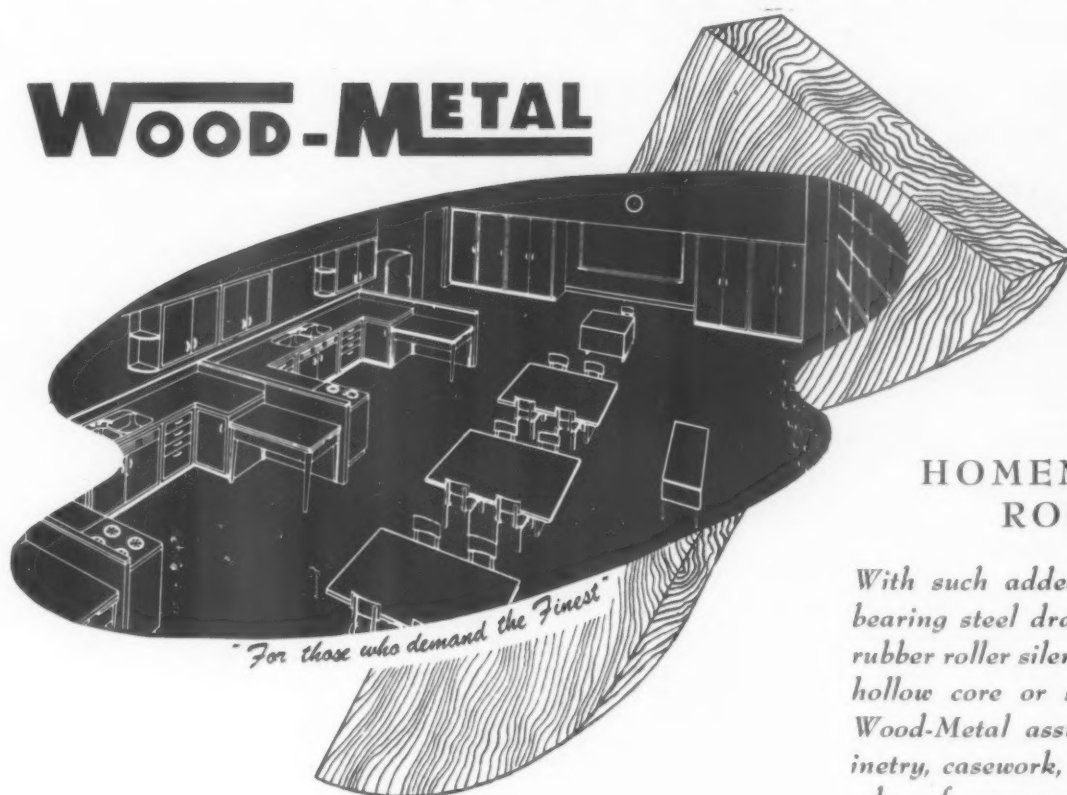
GENERAL  ELECTRIC

# WOOD-METAL INDUSTRIES, INC.

Executive and Sales Offices: 101 Park Ave., New York 17, N. Y.

Plant: Kreamer, Snyder Co., Pa.

## WOOD-METAL



### HOMEMAKING ROOMS

*With such added features as ball bearing steel drawer slides, double rubber roller silent door catches and hollow core or solid construction, Wood-Metal assures superior cabinetry, casework, and tops. A decade of progressive design and craftsmanship combines the beauty of modern home environment with institutional durability.*

REQUEST HOMEMAKING ROOM  
SPECIFICATION SHEETS



RIVERSIDE SCHOOL, RIVERSIDE, CONN.



HAVEMEYER SCHOOL, GREENWICH, CONN.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



# SINGER SEWING MACHINE COMPANY

149 Broadway, New York 6, N. Y.

## *EASIER, MORE EFFECTIVE TEACHING*

### WITH NEW SINGER CLASSROOM MACHINES!

**N**OW'S THE TIME to replace your weary old machines—and enjoy all the easier-teaching advantages of brand-new SINGER\* Electric Sewing Machines.

What a difference they make! Finest classroom models ever—built by the company that's been making the world's finest sewing machines for 99 years.

See how they can simplify teaching for you—simplify learning for your students.

**1. Simpler to operate.** New SINGER Classroom Machines have fewer complicated parts. Machine is easy to thread, bobbin easy to wind. Speed of machine under perfect control at all times. So easy to operate, even a beginner can get beautiful results. Many free teaching aids available on request.

**2. New, improved features.** No more guesswork about tension or stitch size. Machines have numbered tension dial, calibrated stitch regulator. Also: enclosed motor, knee control, reverse feed, convenient sewing light.

**3. Stools to match.** Sturdy, comfortable, attractive for your sewing room. Walnut or mahogany finish. Useful notion and accessories compartment under leatherette cushion.

**4. Less time lost through breakdowns.** Classroom machines are bound to get extra-hard use. And these new SINGER models are built to take it—to keep right on stitching smoothly for years. No other make has such a record of dependability!

**5. Always-prompt service.** A call to your SINGER SEWING CENTER will bring an expert repairman. Free service in cleaning, oiling and adjusting machines.



Where repairs and parts replacements are necessary, written estimates are given in advance. Workmanship guaranteed. Special discounts on parts and supplies.



**6. Future value to students.** What an advantage for your girls to learn to sew on the same kind of machines they're most likely to have in their own homes later—SINGER Sewing Machines!

**ORDER YOUR NEW SINGER ELECTRICS NOW!**

Phone or stop in at your local

## SINGER SEWING CENTER

*There's One Near Your School*

Copyright, U.S.A., 1950, by THE SINGER MANUFACTURING COMPANY  
\*A Trade Mark of THE SINGER MANUFACTURING COMPANY All rights reserved for all countries.

### SPECIAL DISCOUNT TO SCHOOLS

Liberal trade-in allowance on old machines of any make, any age.

419 Fourth Avenue, New York 16, N. Y.

BRANCH OFFICES

Houston      Boston      Atlanta      Newark      Los Angeles      New Orleans      San Francisco  
Pittsburgh      Cleveland      Chicago      Philadelphia      Richmond  
Washington, D. C.      Rochester

Quarries and Mills at Schuyler, Va.

## PRODUCTS AND THEIR PROPERTIES



To



**Slip-tongue Joint—**  
for table tops

**Tongue-and-Groove Joint**—for fume hoods, tanks, sinks

## LABORATORY EQUIPMENT CONSTRUCTION

## WIDESPREAD RECOGNITION AND USE

Quarries and mills at Schuyler, Va., are largest in the world devoted exclusively to production and fabrication of special-purpose stone. Stocks are ample and deliveries can be made promptly.



THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# BAUSCH & LOMB OPTICAL COMPANY

655 St. Paul Street, Rochester 2, N. Y.

New York

London, England

Chicago

Boston

Toronto, Canada

Los Angeles

Rio de Janeiro, Brazil

San Francisco

Sao Paulo, Brazil



## A MICROSCOPE

The Bausch & Lomb Model A Microscope is particularly recommended for use in elementary Botany, Zoology, and Biology classes in high school or college.

Its simple construction makes it the ideal instrument for the hard usage received in classroom service. Its optics are of the precision type.

Its features include the following: Vertical Monocular Body. Standard BGL rack and pinion coarse adjustment

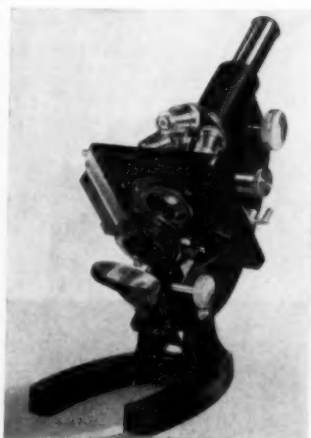
with patented lever type side fine adjustment. Designed to take spiral focusing sleeve substage adapting it to use with oil immersion objectives and making possible complete utilization of the full optical capabilities of the lower and intermediate power objectives. Revolving, dustproof nosepiece, centered and parfocalized at the factory.

Optical Equipment: Achromatic Objectives, 10X (16 mm) 0.25 N.A. and 43X (4 mm) 0.65 N.A. Double Nosepiece—Huygenian Eyepiece 10X. Cat. No. 31-21-40-02.

## BAV MICROSCOPE

The Bausch & Lomb Model BAV Microscope is similar to the Model A but is equipped with the BGL Variable Focus Condenser and other features for more advanced work. A standard instrument in many hospital and professional laboratories, and a basic model in industrial and commercial laboratories, it is not only an ideal instrument for the teaching of microscopy, but it also familiarizes the student with the instrument he will be called upon to use in later professional or business life. Features include a built-on mechanical stage which holds slides 50 x 75 mm, permitting scanning of entire area, rack and pinion substage with Variable Focus Condenser in full ring mount, complete adaptability to a wide range of accessories.

Optical Equipment: Achromatic Objectives, 10X (16 mm) 0.25 N.A. 43X (4 mm) 0.65 N.A. and 97X (1.8 mm) Oil immersion 1.25 N.A. Triple Nosepiece—Huygenian Eyepieces 5X, 10X, Variable Focus Condenser. Cat. No. 31-21-58-08. Integral illuminator, as shown on FL Microscope, available for models A, BAV and CTAV Microscopes.



## CTAV MICROSCOPE

This microscope is especially adapted for advanced Biological work, for Medical Study and Diagnosis and as a general purpose microscope in universities. Has 30° inclined binocular body (interchangeable with monocular tube for photomicrography) with parallel eyepiece tubes. Built-on mechanical stage holds slides 50 x 75 mm, permitting examination of the entire area. New Variable Focus Condenser in full ring mount is in rack and pinion substage. Revolving, dustproof nosepiece, centered

and parfocalized at the factory. Optical equipment of uniform high excellence includes achromatic and fluorite objectives.

Optical Equipment: Achromatic Objectives, 10X (16 mm) 0.25 N.A., 43X (4 mm) 0.65 N.A. and 97X (1.8 mm) Oil Immersion 1.25 N.A. Triple Nosepiece—Huygenian Eyepieces 5X and 10X, Variable Focus Condenser. Cat. No. 31-21-91-08.

## FL MICROSCOPE

An exceptionally low-cost microscope, the Model FL is the first full standard size (12½" high) microscope developed especially to fit student needs and school budgets. Now the Model FL is available with a choice of either the new integral substage illuminator or the concave substage mirror. (The integral illuminator is recommended for extreme simplicity; the mirror is recommended for wide adaptability. Either will make available to the student all the advantages of this fine quality instrument.)

Standard laboratory size and design of the Model FL make it possible to teach proper microscope technique from the very beginning, with nothing for the student to unlearn later. Inclination allows microscope to be tilted to the angle most comfortable for the individual observer . . . just like any laboratory microscope. Cool stage keeps cultures of paramecium, amoeba, and similar specimens alive long enough for accurate observation . . . long enough for drawings to be made.

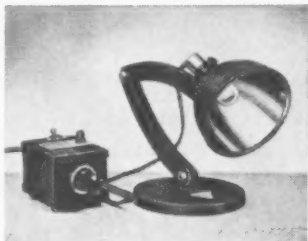
The Model FL is equipped with both coarse and low-position fine adjustments; focusing is made easier by knobs on both sides for each adjustment; the revolving, dustproof nosepiece with roller bearing stop aids accurate centration. Standard BGL 10X Huygenian Eyepiece with specially designed parfocal achromatic objectives of 10X and 50X give 100 and 500 diameter magnifications. Image quality is unmatched by microscopes of similar cost.





## B&L REFLECTOR ILLUMINATOR

This lamp fills a definite need in work with both the monocular or binocular mon-objective microscope and the stereoscopic wide field microscopes. Elliptical mirror reflector with adjustment provides diverging, parallel or converging light.



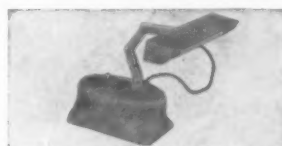
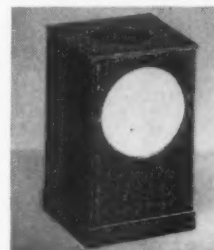
Jointed arm mounting permits all-angle illumination above or below stage. With adjustable transformer, light intensity can be exactly fitted to the work in hand.

Where the necessary range of light intensity does not require a rheostat control, the illuminator is furnished with a lamp for use without transformer.

## OTHER MICROSCOPE ILLUMINATORS

Other B&L Microscope Lamps are available for various purposes in the school laboratory. The ones shown are the B&L Spherical, the Substage, and the Fluorescent Illuminators.

The entire group is completely described and illustrated in Catalog D-119.



## STEREOSCOPIC WIDE FIELD MICROSCOPES



The NEW complete line of Bausch & Lomb Stereoscopic Wide Field Microscopes includes fifteen different models, offering a wide selection of varied assemblies to fit virtually any need. *Patented* sealed in prisms are protected and kept dust-tight for the full life of the instrument. A completely redesigned optical system gives wider field cover-

age without loss of critical focus. Thirteen other points of superiority make these B&L Stereoscopic Wide Field Microscopes *the finest ever built*. For complete information write for Catalog No. D-15.

## B&L SPECTROGRAPHS



The complete B&L line of Spectrographic Equipment covers every need. Models range from the Bunsen Spectroscope (illustrated) for elementary classroom work to the Large Littrow Spectrograph for analyzing complex alloys. Each is designed and built with the utmost care and represents all of the best features necessary for both

teaching and laboratory research. Catalogs D-26 and D-20 give complete details.

## B&L MAGNIFIERS



Of great usefulness in the school laboratory, Bausch & Lomb Hastings Triplet Magnifiers are highly corrected for spherical and chromatic aberration, and have a wide angle of view as well. Magnifications available range from 7X

to 20X. Other types of magnifiers for various purposes are available. Catalog I-15.

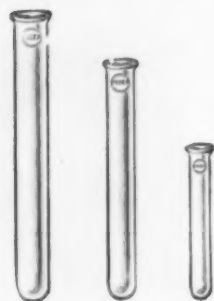
## SEND FOR CATALOGS

For complete information on Laboratory Microscopes and Accessories send for Catalogs D-185 and D-184. For information on Research Microscopes ask for Catalog D-173 and D-1010. Catalog D-15 gives information on Stereoscopic Wide Field Microscopes. For information on B&L Balopticons see pages 628, 629 this catalog. Remember the instruments listed on these pages are but a small part of the B&L Line. If you have need for information on any optical products, Bausch & Lomb will gladly be of service to you.

# CORNING GLASS WORKS

Corning, N. Y.

## PYREX Brand Laboratory Glassware



Test tubes—twenty-two standard sizes from 10 x 75 mm. to 65 x 500 mm.



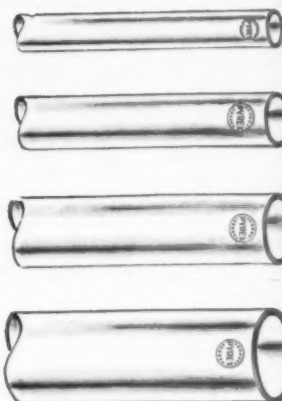
Beakers — for every purpose—over 40 different capacities in 8 standard types



Flasks—Erlenmeyer narrow mouth, capacities from 10 to 6000 ml.



Cylinders — plain or graduated cylinders up to 4000 ml. capacity. Sturdy hexagonal bases, heavy beaded top rims assure longer service life



Glass tubing—standard wall in 4 ft. lengths, O.D. from 3 to 100 mm. Also capillary tubing and solid rod



Funnels — PYREX brand fluted funnels materially cut filtering time, give full support to filter paper. Molded to an accurate 60°, sturdily built for student use



Thistle tubes—molded construction and heavy stems for uniformity and strength spell greater safety for school laboratories

The physical and chemical characteristics of PYREX brand laboratory glassware are so balanced that all of the properties essential for economy, accuracy and durability are combined and maintained at their maximum value.

### STRENGTH

The extremely low thermal expansion coefficient (0.0000032 between 19–350° C.) of PYREX brand chemical glass No. 774 minimizes losses from thermal shock and also permits heavy, rugged construction, thereby increasing resistance to mechanical breakage. The result is greater safety and economies in ultimate glassware costs.

### STABILITY

The low alkali characteristics and the high chemical durability of PYREX brand chemical glass safeguards the accuracy of your analyses.

### DEPENDABILITY

Laboratory control is exercised in every phase of production from raw materials to finished product. This assures you of the consistent quality and uniform dependability which users associate with PYREX brand glassware.

### AVAILABILITY

PYREX brand laboratory glassware is stocked by all leading laboratory supply dealers. Call on your dealer for your PYREX requirements. He is prepared to serve you.

# THE DURIRON CO., INC.

Dayton 1, Ohio

BRANCH OFFICES IN PRINCIPAL CITIES



**WHY  
WHAT  
WHERE**

**Duriron equipment  
is used to handle  
corrosive wastes**

## HERE'S WHY:

DURCO alloys are completely resistant to ordinary corrosives as used in chemical laboratories of educational institutions. Many installations over a quarter of a century old are still as good as new.

DURIRON is a high silicon iron that withstands more corrosives than probably any other metal. DURIMET 20 is a superior stainless steel that is highly resistant to sulfuric and other acids under laboratory conditions.

## HERE'S WHAT:

**DURIRON BELL AND SPIGOT DRAIN PIPE AND FITTINGS** available in 1½", 2", 3", 4", 5", 6" and 8" sizes. 10", 12" and 15" furnished to order. Working dimensions same as cast iron. Ask for Bulletin 703.

**DURIRON EXHAUST FANS**—Built in five sizes, providing a capacity range from 20 to 5,000 CFM. Ask for Bulletin 1102.

**DURIRON LABORATORY SINKS  
SINK STRAINERS  
FLOOR DRAINS  
HEMISPHERICAL BOWLS  
PUMPS, VALVES, FLANGED PIPE**

Details in  
Bulletin 703

**DURIMET 20 SHEET** for fume ducts. Ask for Bulletin 502.

## HERE'S WHERE:

**CHEMICAL LABORATORIES:** Laboratory sinks, sink outlets, traps, drains, and fume hoods.

**KITCHENS, X-RAY DARK ROOMS:** Sink outlets, traps and drains.

### SOME OF THE EDUCATIONAL INSTITUTIONS WHERE DURIRON EQUIPMENT IS INSTALLED

Alabama Polytechnic Institute, Ross  
Chemical Labs.  
Amherst College, Dept. of Chemistry  
Armour Institute of Technology  
California Institute of Technology  
Case School of Applied Science,  
Rockefeller Met. Lab.  
Columbia University  
Cornell University  
Duke University  
Massachusetts Institute of Technology  
McGill University, Montreal  
New York University  
Rochester Institute of Technology  
Southern Methodist University  
State Teachers College (Edinboro, Pa.)  
University of Arkansas, Science Bldg.  
and Med. School  
U. of California, Life Science Bldg.  
University of Idaho, Science Hall  
University of Illinois  
University of Missouri  
University of Pittsburgh  
University of Washington  
West Virginia University, Hall of Chemistry  
William and Mary College  
Yale University

Besides many other public and private colleges  
and universities, over one thousand high schools  
throughout the United States and Canada.



# GENERAL CERAMICS AND STEATITE CORP.

(CHEMICAL EQUIPMENT DIVISION)

Keasbey, New Jersey

BUFFALO, 220 Delaware Avenue  
CHICAGO, 20 N. Wacker Drive  
LOS ANGELES, 415 South Central Avenue  
PITTSBURGH, 412 Peoples Gas Building  
PORTLAND 14, ORE., 1834 S. E. 8th Avenue  
SAN FRANCISCO, 598 Monadnock Building  
SEATTLE, 1411 Fourth Avenue

TACOMA, 417 Tacoma Building  
MONTREAL, CANADA, Emmons Ltd., Canada  
Cement Building  
TORONTO, CANADA, Richardson Agencies Ltd.,  
454 King Street, West  
VANCOUVER, B. C., Willard Equipment Ltd.,  
860 Beach Avenue



## Acid-proof chemical stoneware **CERAWARE** and porcelain **CERAWITE** laboratory equipment

A complete line of acid-proof chemical stoneware and porcelain equipment for chemistry and physics laboratories in educational and research institutions, and for general industrial purposes. Ideal wherever corrosive fluids and gases are used.

**PRODUCTS** Laboratory sinks, drain pipes and fittings, sumps, fume ducts, pumps and exhausters.

### CHEMICAL STONWARE (CERAWARE)

is a dense, granite-like material finished in a high lustre, glazed surface. Both the glaze and the body of the ware are completely impervious to all acids and gases, excepting hydrofluoric acid and strong hot caustics. Mechanically strong, leakproof and easy to clean, it lasts indefinitely.

### CHEMICAL PORCELAIN (CERAWITE)

is a non-porous, high-fired, completely dense porcelain body with a smooth white finish. It offers unusually high resistance to thermal shock and corrosion. A deluxe version of Chemical Stoneware (Ceraware.) Exceptionally corrosion-proof.



Easy to clean laboratory sink with double drain board. Available in either brown colored Chemical Stoneware (Ceraware) or gleaming white Chemical Porcelain (Cerawite.)

### ONE PIECE CONSTRUCTION

General Ceramics' sinks feature one piece construction, with integral drain board, backs, tail piece, overflows, traps, etc., as required. Sink bottoms provide necessary drainage. Corners rounded at sides and bottom. Chemical Stoneware (Ceraware) sinks finished in rich, chocolate brown color. Chemical Porcelain (Cerawite) provides a smooth, gleaming white surface. Both finishes are highly attractive, easy to clean.

### A Partial List of Leading Universities and Colleges Now Using General Ceramics Acid- Proof Laboratory Equipment

Yale University  
Purdue University  
Harvard University  
University of Illinois  
Duke University  
University of Chicago  
University of California  
Radcliffe College

### ACID-PROOF PIPE LINES AND FITTINGS

In order to provide drain lines and fittings with the same type of corrosion-proof materials as the laboratory equipment, both Chemical Stoneware (Ceraware) and Chemical Porcelain (Cerawite) are manufactured in a complete line

of acid-proof pipes, valves and fittings. This also includes such equipment as kettles, jars, filters, tanks, sumps, pumps and exhausters. Both materials will last as long as the building.



Installation of piping at the Sterling Chemistry Laboratory, Yale University. General Ceramic's Sinks, Drain Lines and Fittings are used throughout this building. A similar installation was also made in Chemistry Buildings at Harvard University.

### ENGINEERING SERVICE

General Ceramics maintains a complete engineering service available for the design of special laboratory equipment and in the planning of laboratories and other buildings where corrosive materials are processed. Free literature on acid-proof laboratory equipment, pipes and fittings available upon request.

⊕ 6396

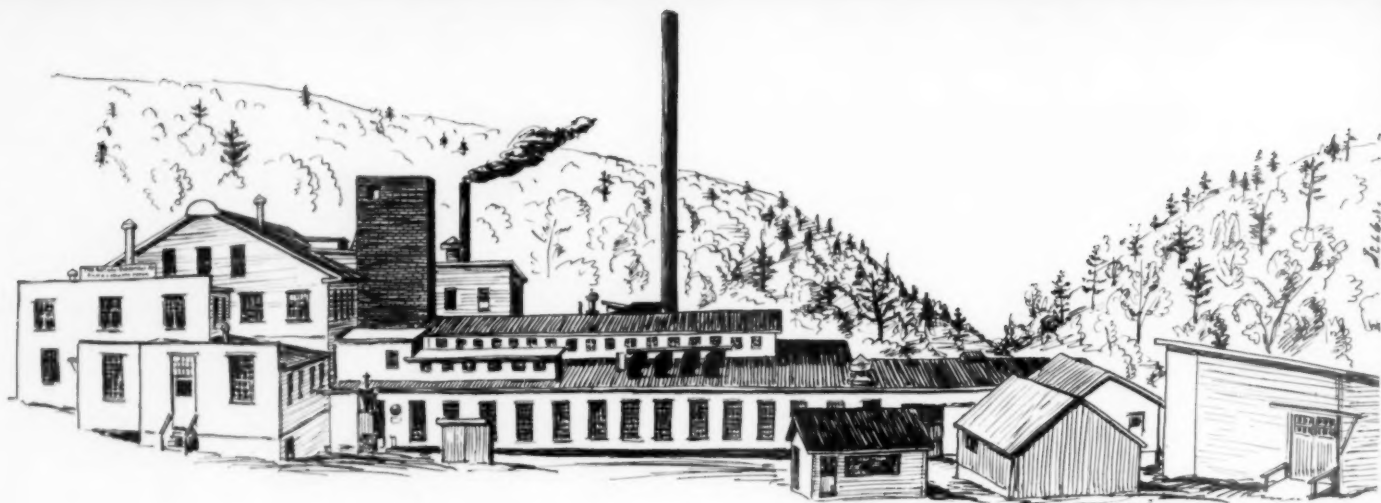
# **FILTER PAPER**

**FOR LABORATORY  
FOR INDUSTRY**

**MADE FROM SELECTED MATERIALS  
AND PROCESSED UNDER STRICT  
LABORATORY SUPERVISION —  
DEPENDABLY UNIFORM PERFORM-  
ANCE AND PURITY**



**THE EATON-DIKEMAN COMPANY**  
**MOUNT HOLLY SPRINGS, PENNSYLVANIA**



## FILTER PAPER—YESTERDAY and TODAY

Although paper was suggested as a filter medium as early as the latter part of the eighteenth century, its use developed but slowly. For more than a century handmade filter papers were employed, but their use was chiefly in laboratories while much of the industrial filtration was performed by makeshift use of blotter and miscellaneous other types of paper. Until the supply was shut off by World War I, virtually all filter paper used in America was imported from Europe. Machine-made filter paper was almost unknown, and the handmade variety persisted despite its poor formation, non-uniform performance and the limited forms and sizes in which it could be obtained. Such filter paper as was made here was in incidental quantities for specific application and was not available for general consumption. But what we did make was machine-made.

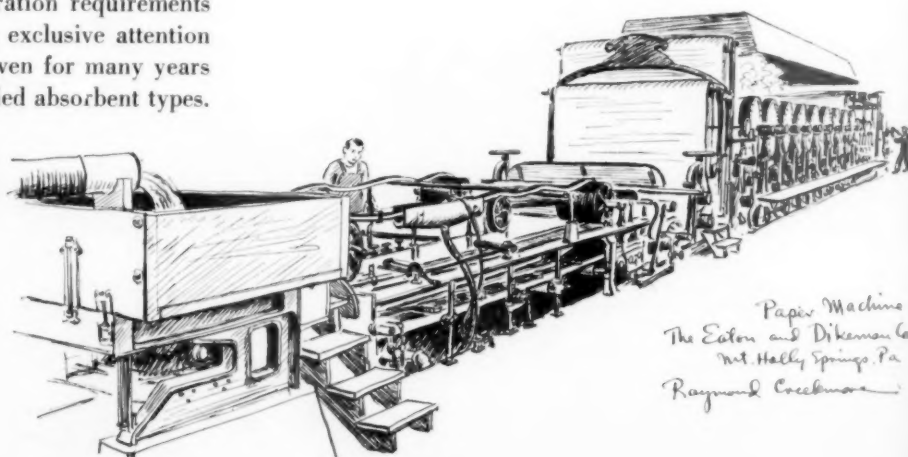
The Eaton-Dikeman Company, paper makers since 1890, had occasionally produced one type of filter paper for a large industrial concern. When the European supply was terminated, a large scientific supply firm submitted its filter paper problem, others followed, and the finger of destiny began to point. Over the intervening years, and with increasing frequency, the Company was called upon to supply filter paper for many and varied needs. The constantly increasing filtration requirements of both science and industry demanded the exclusive attention which Eaton-Dikeman Company has now given for many years to the manufacture of filter paper and its allied absorbent types.

The use of Filter Paper begins in the laboratories of the schools and colleges and continues, along with the student, into industry—to the scientific and industrial laboratories and into industrial processing.

In the laboratory, lightweight filter papers are employed—chiefly in funnel work. But when the operation is translated into the larger terms of an industrial process, the filter papers too, must be transformed to meet the new

conditions—yet they must produce the same results. To meet such requirements involves numerous grades covering a wide range of varied characteristics, but with the common attribute of *dependable uniformity* for which Eaton-Dikeman Filter Papers are distinguished.

The Eaton-Dikeman Company manufactures Filter Paper exclusively, producing more than sixty regular grades and forty special grades. Of the regular grades, two-thirds are primarily for laboratory use, and the balance for industrial application. All grades, however, are employed industrially. This broad selection covers virtually the entire field of liquid filtration and is an important contribution to the production of our foods, beverages, drugs and chemicals, lubricants, paints, plastics, soaps and cosmetics, etc. Also, although unrelated to their primary purpose, there are innumerable other applications—such as foundations for plastic products, for litmus and similar test papers, for seed germination tests, and as absorbent material in applications ranging from medicinal inhalers to air-conditioning systems.

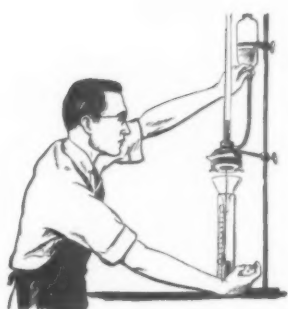


Paper Machine  
The Eaton and Dikeman Co.  
Mt. Holly Springs, Pa.  
Raymond Cressman

# FILTER PAPER E & D FILTER PAPER



# CHOOSING A FILTER PAPER



The ideal filter paper should be rapid in filtration, sufficiently retentive to hold back even the finest particles of suspended matter, and sufficiently strong when wet to withstand the mechanical stresses of filtration. In the selection of the right paper for any particular purpose, the accompanying table of physical characteristics will be helpful. The qualities measured in this table are defined as follows:

**Rapidity** is shown as the quantity of distilled water, milliliters per minute, that passes through a single small disc of the paper under a standardized set of conditions. Rapidity is also an inexact but nonetheless definite indicator of *retentivity*, and because of this double significance is one of the major control items during manufacture. With papers of equal weight, the slower paper will be the more retentive; and with papers of equal rapidity, the heavier will be the more retentive. A projection of the relationship of weight (which connotes thickness) and retentiveness suggests the term "filtration in depth." It is often necessary, in order to accomplish desired results, to employ two or more laminations of a single grade, or a laminated combination of several grades. Such groups, prepared and stitched as units, are known as *Combination Pads*. Myriad such combinations are possible, and their capacities extend far beyond those of any individual paper.

Further filtration in depth, with resulting increase of retentivity, of filtration efficiency, and of useful life of the paper, is accomplished by use of filter aids. These finely divided inert materials, such as diatomaceous earth, when added to the material to be filtered, accumulate against the filter paper to form a thick, porous cake of superior filtering qualities and resistance to blinding.

As yet there is no generally accepted method for exact grading of filter paper for retentivity — as, for instance, on the minimum particle size retained. A general distinction is made for laboratory grades, however, on the basis of ability to retain residue from certain standard solutions — barium sulphate for fine particles, lead sulphate for medium, and ferric hydroxide for coarse or gelatinous materials.

Of the three *surface* finishes—smooth, embossed and creped—the first two are considered one, inasmuch as embossing is chiefly for identification purposes. Creping, however, completely changes the characteristics by greatly increasing rapidity, somewhat reducing retentivity, and by imparting the ability to handle gelatinous or voluminous residues that would quickly block or "blind" a smooth-surfaced paper.

**Texture** is a component of the kind and treatment of the pulp beforehand and of the processing upon the paper machine. The gradations of texture from very hard to very soft are part and parcel with other controls in producing the individual filtering characteristics of the various grades. Texture has particular significance in relation to absorbency, and is of special importance where the paper is employed in the making of test papers and for other non-filtration uses.

**Wet strength** is determined, following the rapidity tests, by measuring the height of the water column needed to break the standard test specimen. Certain grades are especially treated to impart a high wet strength, which may be as much as twenty times that of the untreated paper. This treatment also hardens the paper and renders it essentially lintless, but does not degrade its purity or neutrality.

**Quality** of the paper rests in the materials from which it is made, together with the care in manufacture. It should be as inert as possible, essentially neutral, and with the greatest possible freedom from foreign materials and chemicals, particularly calcium and the various metals.

Of paramount importance to the user, once a suitable paper has been selected, is *dependable uniformity* of both quality and performance.

## Physical Characteristics E & D Filter Papers

Grade	Thickness Inches	Basis Wgt. Lb.†	Surface	Color	Rapidity *	Wet Strth. **
1	.0065	20	Emb.	White	80	4.5
4	.007	22	Smooth	White	110	5.0
5	.007	24	Smooth	White	60	5.5
7	.0065	20	Smooth	White	170	4.2
048	.007	25	Smooth	White	30	6.5
192	Same as 612, Folded					
193	Same as 613, Folded					
195	Same as 615, Folded					
215	.010	20	Creped	White	225	HWS 20
248	.0065	25	Smooth	White	15	6.5
255	.008	15	Creped	White	275	HWS 20
301	.030	90	Smooth	White	70	7.5
301	.052	145	Smooth	White	60	10.5
320	.100	200	Smooth	White	200	7.5
508	Same as 608, Folded					
509	Same as 609, Folded					
522	Same as 622, Folded					
529	Same as 629, Folded					
534	Same as 634, Folded					
540	Same as 640, Folded					
541	Same as 641, Folded					
550	Same as 950, Folded					
552	Same as 952, Folded					
554	Same as 954, Folded					
604	.007	22	Emb.	White	140	4.5
607	.010	32	Smooth	White	60	4.5
608	.013	40	Emb.	White	25	8.5
609	.008	28	Smooth	White	70	4.0
611	.005	16	Smooth	White	65	4.0
612	.008	20	Emb.	White	60	4.5
613	.006	20	Smooth	White	60	4.8
614	.006	13	Creped	White	500	2.5
615	.010	20	Creped	White	225	4.5
616	.015	28	Creped	White	400	5.0
617	.019	35	Creped	White	375	5.8
619	.011	20	Creped	Grey	275	4.5
620	.008	20	Emb.	Grey	65	4.5
622	.008	20	Emb.	White	30	5.5
622	.008	20	Emb.	Grey	40	5.5
623	.026	70	Smooth	White	200	10.0
623	.030	78	Smooth	White	170	10.5
623	.038	95	Smooth	White	130	11.5
624	.022	63	Smooth	White	160	10.0
624	.034	90	Smooth	White	135	12.0
625	.026	70	Smooth	White	160	10.0
625	.030	78	Smooth	White	160	11.0
627	.023	65	Smooth	White	120	10.5
627	.026	75	Smooth	White	100	11.5
627	.030	85	Smooth	White	80	12.5
628	.026	75	Emb.	Tan	80	7.0
628	.035	95	Emb.	Tan	60	8.0
629	.012	35	Smooth	White	120	7.0
632	.042	84	Creped	White	60	14.0
633	.038	70	Creped	White	450	9.5
633	.041	75	Creped	White	400	10.0
634	.032	54	Creped	White	450	8.5
637	.012	28	Creped	White	700	4.0
638	.035	75	Creped	Tan	100	9.0
640	.025	44	Creped	White	450	6.0
641	.014	41	Smooth	White	180	7.0
652	.050	150	Smooth	White	20-25	17.0
655	.008	15	Creped	White	275	HWS 10
95	.007	25	Smooth	White	15	HWS 60
952	.007	25	Smooth	White	70	HWS 60
954	.0065	20	Smooth	White	180	HWS 40

\*Rapidity—Relative Filtration Rate of Distilled Water Under Standardized Conditions.

\*\*Wet Strength—Relative Bursting Strength of Wet Paper Under Standardized Conditions.

"HWS" Indicates Grades Especially Treated to Attain High Wet Strength.

†Basis Weight—20"x20", 500 Sheets.

# FILTER PAPER E&D FILTER PAPER

# FILTER PAPERS

FOR SCHOOLS & COLLEGES • FOR SCIENCE & INDUSTRY

**For Light and Heavy Funnel Work, Filter Presses and  
Filter Machines of All Kinds:—**

## Qualitative Filter Papers

Eaton-Dikeman Qualitative Filter Papers are produced under strict laboratory supervision, from selected cotton fiber, and are processed in a locality notable for its pure water and freedom from industrial aerial pollutions. These factors are fundamental to the outstanding reputation of Eaton-Dikeman Products for purity and performance, and for *dependable uniformity*.



### E&D Regular Grades

These comprise the majority of E&D Papers — for general qualitative purposes and for industrial uses.



### E&D Purity Grades

This series of 7 papers is of exceptional purity and texture, made from extra-quality raw materials. Included are those papers formerly known as "NEW FILT."

### High Wet Strength, Lintless Grades

Use these for applications requiring:

1. A hard paper resistant to pressure.
2. A lintless surface from which precipitates can be scraped or washed.
3. A high wet strength for use under pressure or in very large funnels; for long filtrations, or for use with severe chemicals.



## Folded Filter Papers

All laboratory grades are available ready folded for immediate use. When opened, a fluted cone is formed to speed filtration by exposing the entire surface of the paper and by providing flow channels between the paper and the funnel.

## E&D Industrial Filter Papers

More than 100 grades provide a selection for every industrial application. All are built to the same high standards of quality and performance, and are available in rolls, sheets or die-cut shapes as required.



## Combination Pads

Individually designed to meet requirements beyond the capacity of a single grade, these pads consist of several laminations of one or more grades, cut to required shape and stitched to form convenient units.



## Coffee Filter

E&D Filter Paper provides improved flavor and coffee economy in drip, percolator and restaurant types of coffee-maker.

# ASK FOR E&D FILTER PAPER

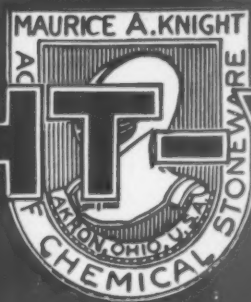


**Available in Rolls, Circles,  
Sheets and Special Shapes  
from Your Dealer  
in Paper,  
Laboratory Supplies,  
or Filtration Specialties**

*Write address below for samples or technical information*

**THE EATON-DIKEMAN COMPANY**  
MOUNT HOLLY SPRINGS, PENNSYLVANIA

# KNIGHT-WARE



*Laboratory Equipment*

## What Knight-Ware Is

Knight-Ware is an improved ceramic product having a tight, close-grained body which is tough, uniform, thoroughly vitrified and wholly inert to the action of acids, alkalis, chemicals and corrosive solutions and gases, weak or strong, hot or cold. Its acid-proof qualities do not depend upon any glaze, enamel or veneer. "It is the body itself."

Knight-Ware is light weight yet mechanically strong, and is equalled only by glass or fused silica for acid resistance.

A typical specification should read, "All parts of plumbing and ventilating system subject to the action of chemical wastes, acid fumes or chemical corrosion shall be of Knight-Ware as manufactured by Maurice A. Knight of Akron, Ohio."

## Where Used

Knight-Ware Laboratory Sinks, Table Troughs, Sumps and Piping are used in school, university and commercial laboratories,

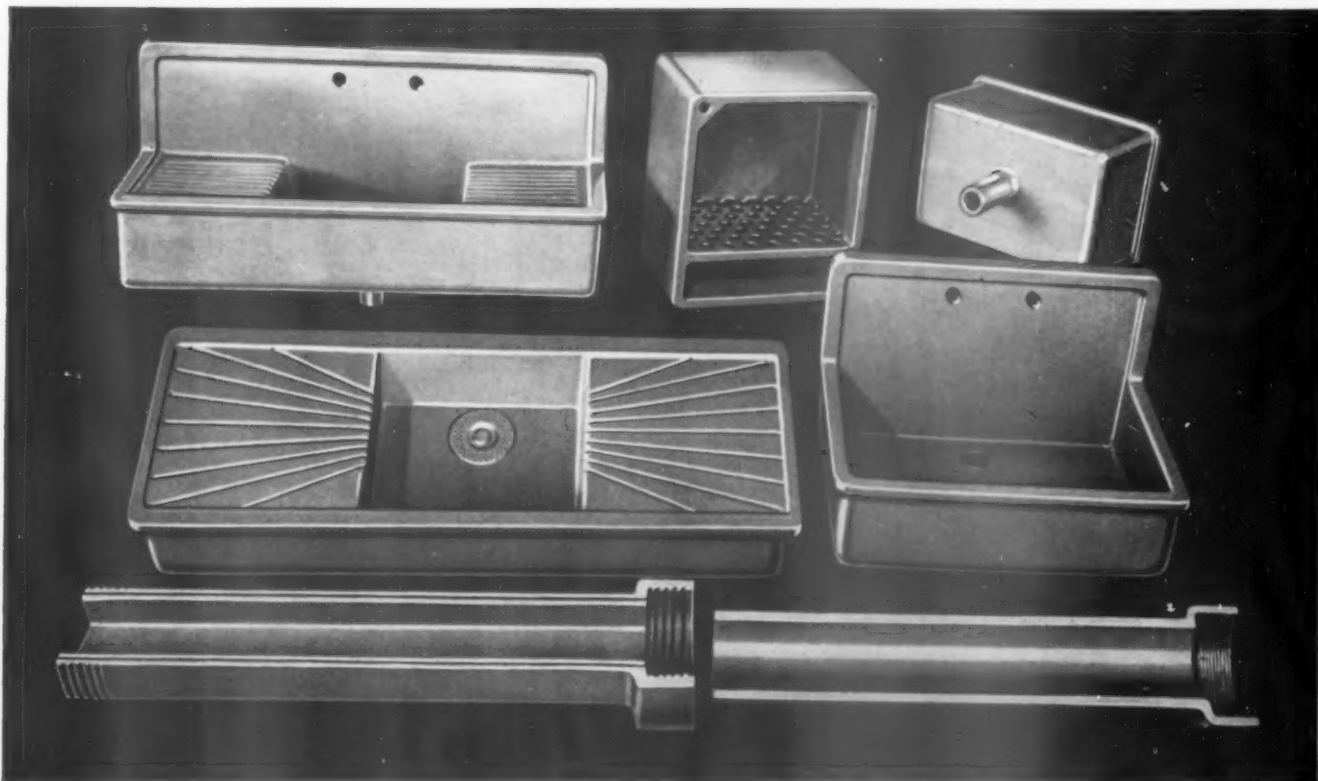
in hospitals, in newspaper buildings and wherever acid-proof waste or ventilating lines are necessary.

Knight-Ware Plant Equipment is used by the manufacturer and the user of chemicals, and in processes where contamination must be avoided.

## Laboratory Sinks

Knight-Ware Laboratory Sinks are custom built to suit your requirements. Because they are entirely handmade, it costs no more for this service. The one-piece construction, smooth surfaces, rounded corners and acid-proof quality mean a freedom from leaks and a cleanliness that is permanent. Outlets of various designs, back, drainboards and apron are optional as an integral part of sink.

Please submit sketch and dimensions when requesting quotation on sinks or tanks. Complete catalog will be sent on request.



MAURICE A. KNIGHT - LABORATORY EQUIPMENT - AKRON, OHIO, U.S.A.



## ACID WASTE-PIPE AND FITTINGS

Knight-Ware Bell and spigot pipe and fittings are available in any bore from 1 up to 60 in. in any lengths up to 5 ft. Special fittings for unusual places or to eliminate unnecessary joints are furnished at no great increase in cost. Flanged or plain ground end connections can be furnished where desired.

Knight-Ware Acid-Proof Traps supply their own liquid seal when in use, and thus prevent or minimize the escape of gases from the waste system.

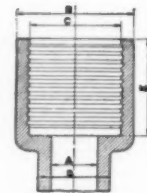
Knight-Ware B&S joints packed and poured to our specifications are absolutely acid and leak proof. Installation is no more difficult than with ordinary cast iron pipe.



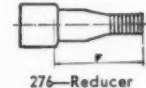
271-A—Double Hub Pipe

### 271 and 271-A—Single and Double Hub Pipe

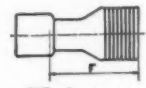
Supplied in bores up to 12 inches—larger if desired. In large installations, 10 to 15 per cent of the straight lengths should be of the Double Hub type, so when it is necessary to cut pipe, both pieces may be utilized. All hubs are deep—and both hub and spigot ends are well corrugated to insure a leak-tight joint.



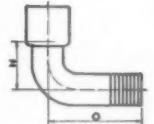
Detail of Hub



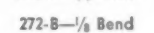
276—Reducer



277—Increaser



272-A—1/4 Bend



272-B—1/8 Bend

271—Single Hub Pipe

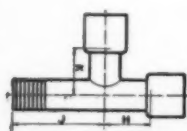
272-A and 272-B

A in.	D in.	Lgth. feet	271 Wt. per ft.
1	1 1/2	1 to 3	2 1/4
1 1/2	2 1/4	1 to 5	3 1/4
2	2 3/4	1 to 5	4
3	4	1 to 5	5 1/2
4	5	1 to 5	8 1/2
5	6	1 to 5	11
6	7 1/4	1 to 6	15
8	9 1/2	1 to 6	20
9	10 1/2	1 to 6	24
10	11 3/4	1 to 6	28
12	13 3/4	1 to 6	36

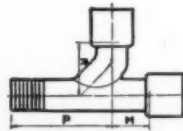
Bore in.	N in.	O in.	Wt. lbs.
1	4	8	2 1/2
1 1/2	4	8	3 1/2
2	4	8	4 1/2
3	4	8	8 1/2
4	6	10	12 3/4
5	6	10	17
6	6	10	23
8	10	14	40
9	10	14	48
10	10	14	56
12	12	16	84



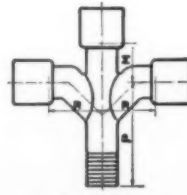
272-D—Twin Elbow



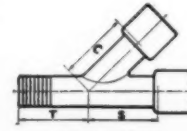
273—Single T-Fitting



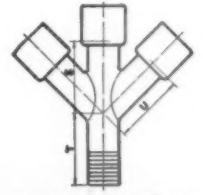
273-A—Single Y



273-B—Double Y



274—Single Y

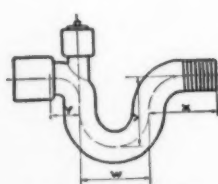


274-A—Double Y Fitting

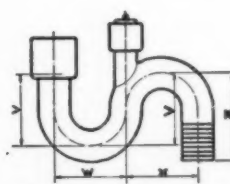
Bore in.	N in.	O in.	272-D Wt. lbs.	Bores in.	I in.	H in.	K in.	273 Wt. lbs.	P in.	M in.	R in.	273-A Wt. lbs.	273-B Wt. lbs.	S in.	T in.	U in.	274 Wt. lbs.	274-A Wt. lbs.
1	4	8	4 1/2	1x1	8	4	3	5	8 3/4	3 1/4	3	5	6	6	6	6	5	7 1/2
1 1/2	4	8	6	1 1/2x1 1/2	8	4	3	8	8 3/4	3 1/4	3	6	7	6	6	6	8	10 1/2
2	4	8	7	2x2	8	4	4	10	8 3/4	3 1/4	3	8	8 1/2	6	6	6	10	12
3	4	8	11	3x3	8	4	4	13	8 3/4	3 1/4	4	10	12	8	8	8	12	15
4	6	10	20	4x4	12	6	5	23	13 1/4	4 3/4	7	23	28	10	8	10	22	27
5	6	10	29	5x5	12	6	5	30	13 1/4	4 3/4	8	27	38	12	9	12	30	36
6	6	10	36	6x6	12	6	6	34	13 1/4	4 3/4	8	35	52	12	9	12	42	47
8	10	14	55	8x8	14	10	8	60	16	8	12	64	85	16	12	16	73	80
9	10	14	72	9x9	14	10	9	72	18	8	12	85	105	18	12	18	95	105
10	10	14	90	10x10	14	10	10	85	18	8	14	110	110	20	12	20	110	125
12	12	16	125	12x12	14	10	12	105	18	9	14	125	140	22	12	22	150	185



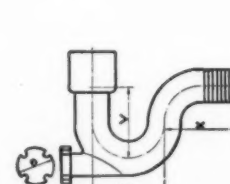
267-A—Running Trap with 2 Cleanouts



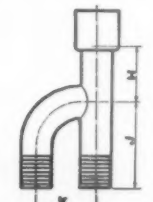
267—Running Trap with Single Cleanout and One Plug



268—S Trap with Cleanout



269-A—P Trap with Flange Cleanout



273-E—Vent T Fitting

Bore in.	V in.	W in.	X in.	Y in.	267 Wt. lbs.	267-A Wt. lbs.	V in.	W in.	X in.	Z in.	268 Wt. lbs.	D in.	V in.	W in.	X in.	Y in.	269-A Wt. lbs.	Bores in.	I in.	H in.	K in.	273-E Wt. lbs.
1	4	4	6	3	7	8	4	4	4	5	6 1/2	4	4	4	6	2 1/4	5	1x1	8	4	4 1/2	4
1 1/2	6	6	6	3	8	10	6	6	6	7 1/2	7 1/2	4	6	6	6	3 1/4	8	1 1/2x1 1/2	8	4	5 1/2	8
2	6	6	7	4	15	17	6	6	6	7 1/2	14	4	6	6	7	3 1/2	11	2x2	8	4	5 3/4	10
3	8	8	8	4	20	25	8	8	8	10	19	5	8	8	8	4 1/2	21	3x3	8	4	7	13
4	9	9	9	5	35	40	9	9	9	11 1/2	30	5	9	9	9	5	30	4x4	12	6	8 1/2	22
5	9	9	10	5	44	58	9	9	9	12	42	5	9	9	10	5 3/4	43	5x5	12	6	10 1/2	32
6	10	10	10	6	58	63	10	10	10	14	52	5	10	10	10	6 1/2	52	6x6	12	6	11 1/2	48
8	15	15	12	8	100	112	15	15	15	20	95	6	15	15	12	7	95	8x8	14	10	13 1/2	73
9	16	16	14	8 1/2	130	138	16	16	16	22	125	6	16	16	12	8 1/2	130	9x9	14	10	15	80
10	18	18	14	9	155	165	18	18	18	24	150	6	18	18	14	9	148	10x10	14	10	16	100
12	20	20	18	10	220	235	20	20	20	26	220	6	20	20	18	10	220	12x12	14	10	19	120

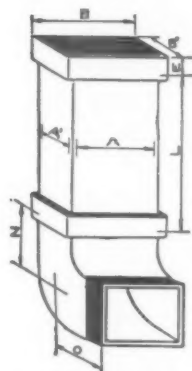
# Y E Q U I P M E N T

## VENTILATING EQUIPMENT

Protection against acid and other corrosive gases or fumes in the installation of ventilating pipes and fittings may be even more important than in the case of laboratory waste and drainage lines. Vent lines are often built solidly into walls as a permanent installation. Repair or replacement, due to corrosion caused by a leaking ventilating system, may therefore be serious and costly.

A ventilating system acts as a huge condenser for the acid fumes, which are collected in the form of highly concentrated acids or chemicals without possibility of dilution or drainage. That is why leading colleges, universities, high schools, hospitals and commercial laboratories—built for permanence—specify Knight-Ware Acid-Proof Ventilating Pipes and Fittings.

Knight-Ware Ventilating Pipes and Fittings will permanently withstand any acid, alkali or corrosive—hot or cold—weak or strong—hydrofluoric acid alone excepted. Knight-Ware Ventilating Pipes and Fittings should be ordered the same as Waste Lines and Fittings—referring, if possible, to figure numbers in Tables as shown below, also dimensions, including sketches or blueprints of special fittings.



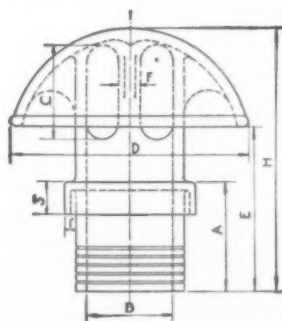
351—Rectangular Pipe and Elbow

### Round and Rectangular Ventilating Pipes and Elbows

Either round or rectangular Knight-Ware Acid-Proof Ventilating Pipe and fittings can be furnished in the various sizes as given in the Tables at right. Special sizes and dimensions are also available. Blueprints and sketches must accompany your order for special piping.

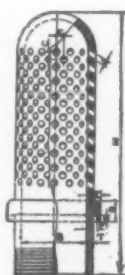
When ventilating pipe must be installed in spaces too limited for regular socket joints, we supply a ventilating pipe with plain, ground butt-ends for banded joints. These are made in standard sizes as well as for special requirements.

### Ventilating Roof Caps—Two Types



352—Ventilating Roof Cap

Illustrated are two kinds of Knight-Ware Ventilating Roof Caps, although we can furnish other types. Types shown are made to exclude rain, snow, etc. Combined area of openings exceeds three times cross-sectional area of cap, which provides ample security against back-pressure. Note provision made for flashing.



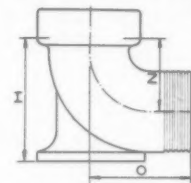
352 Ventilating Roof Cap

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These floors are designed for rugged endurance as well as for acid resistance. They are impervious to strong alkali cleaners, oils, fats and greases as well as most acids. PERMANITE Floors are easily cleaned and will withstand steam sterilization without softening. Recommended for laboratories, food processing plants, metal plating rooms and chemical plants.

### Base Elbows for Ventilating Pipe



272-AB—Base Elbow

A Base Elbow is used to start off a ventilating line from a hood. Special designs can be furnished. Both right and left offset types such as shown in picture on page 4 can also be furnished.

For Dimensions in Table of Round Pipe  
See Details of Hub on Page Two

A in.	D in.	C in.	B in.	E in.	L ft.	271 Round Wt. per ft.
10	11 3/4	13 3/4	15	4	1 to 5	28
12	13 3/4	15 3/4	17	4	1 to 5	36
15	17	19 1/4	21	4	1 to 5	45
18	20	22 1/4	24 1/2	4	1 to 5	70
20	22	24 1/2	26 1/2	4	1 to 5	80
24	26 1/2	28 1/2	30 1/2	4	1 to 4	95
27	29 1/2	31 3/4	33 3/4	4	1 to 4	110
30	32 1/2	34 3/4	36 3/4	4	1 to 4	120

A <sub>1</sub> in.	A in.	B <sub>1</sub> in.	B in.	E in.	L ft.	N in.	O in.	351 Rect. Wt. per ft.
8	12	13 1/2	17 1/2	4	1 to 5	10	16	33
10	15	15 1/2	20 1/2	4	1 to 5	10	16	45
12	18	18	24	4	1 to 5	12	18	60
15	20	21	26	4	1 to 5	14	20	95
18	24	24	30	4	1 to 5	16	22	140
20	30	26	36	4	1 to 4	18	24	165

B in.	C in.	D in.	E in.	F in.	G in.	H in.	J in.	T in.	352 Wt. lbs.
6	3/4	3	1	1/2	3/4	30	3/4	3/4	45
8	1	3	1	1/2	1	30	3/4	3/4	60
9	1	3	1	1/2	1	36	1	1	80
10	1	3	1	1/2	1	36	1	1	90
12	1	3	1	1/2	1	36	1	1	115

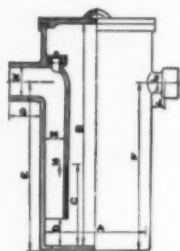
A in.	B in.	C in.	D in.	E in.	F in.	H in.	353 Wt. lbs.
10	6	7	16	17	1 1/2	24	60
10	8	7	22	16	2	24	80
10	9	8	24	15	2 1/4	24	100
10	10	9	26	14	2 1/2	24	120
10	12	10	30	12	3	24	145



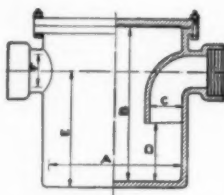
Permanite floor of non-skid, vitrified brick and Permanite cement

## KNIGHT-WARE SUMPS

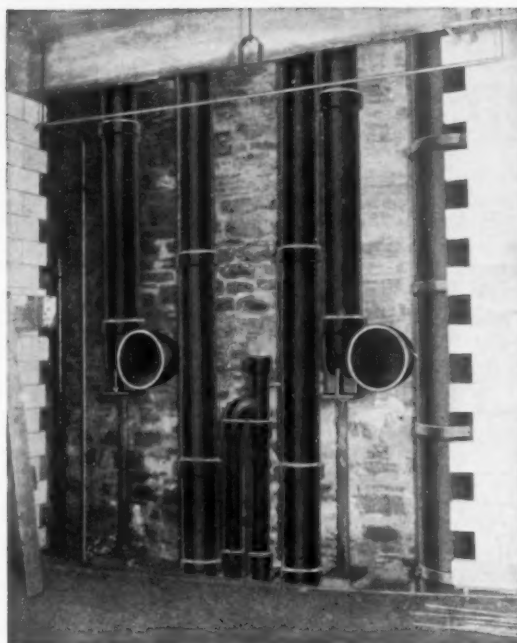
We supply two types of Knight-Ware Sumps and Dilution Basins, Type "A" shown at left, and Type "B" shown at the right. The Smaller Type "B" has only one inlet, while the larger Type "A" may have several at any desired angles to receive the various waste lines running into it. Cover on Type "B" is provided with bolt holes and may be had in either flat or dome shaped style. Cover for Type "A" can be furnished to be set in a socket or can be sealed with glycerine.



400—Style "A" Sumps



401—Style "B" Sumps



Knight-Ware Waste and Ventilating Lines in the Frick Chemical Laboratory, Princeton University

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Washington & Jefferson College  
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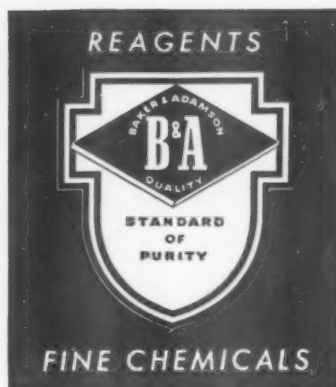


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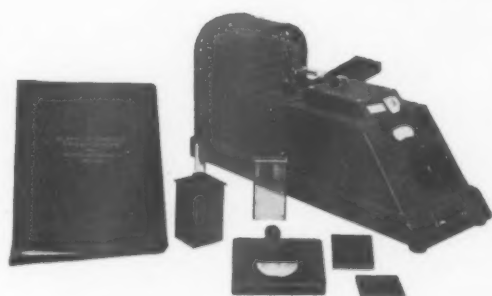
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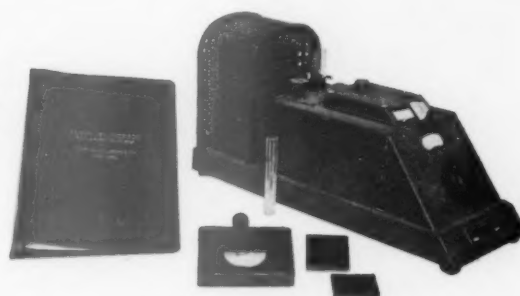
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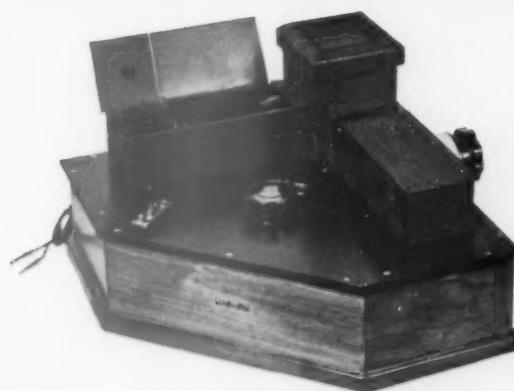
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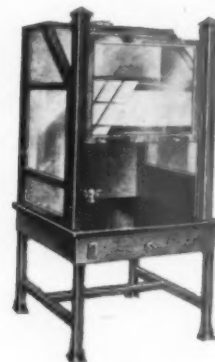
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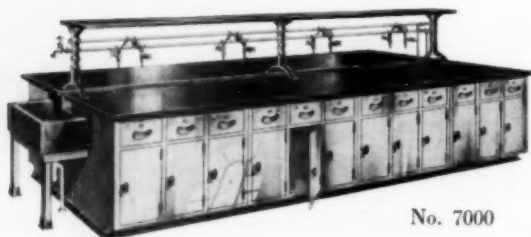
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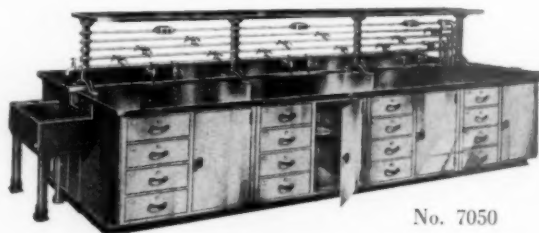
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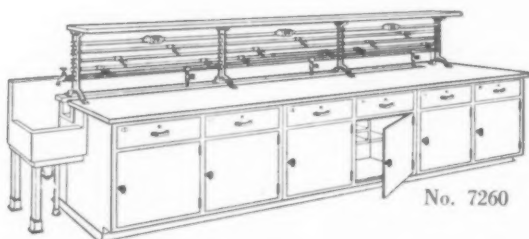


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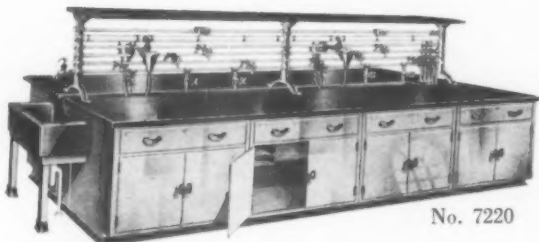
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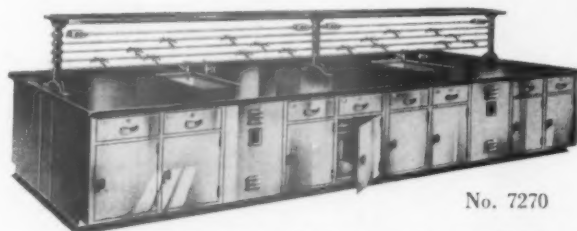
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**Instructor's Desk**. Choice of drawers, cupboards, service fixtures, etc. 14' long, or longer or shorter. Safety glass explosion shield and heat pad, optional.



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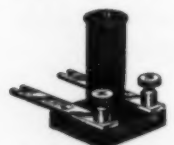
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**RESISTORS:** Fixed resistors and adjustable resistance boxes—some designed for either direct or alternating current, others for both. Adjustable d-c resistors are supplied in open-dial-switch, enclosed-switch, post-office pattern, and link connector types. New a-c resistance boxes with low reactance make available high stability, low contact resistance, convenience.

**INDUCTORS:** Fixed and adjustable, for use as standards of inductance in a-c bridge measurements up to 1000 cycles. The fixed type are available as standards of self inductance or mutual inductance. Brooks Inductometers are used to vary self inductance of a circuit, or mutual inductance between two circuits.

**CAPACITORS:** A choice of both silver-mica and air capacitors in fixed and adjustable models. With high Q values, the completely new silver-mica capacitors are unusually stable. Fringing and internal inductance are minimized; temperature changes have negligible effect.

**STANDARD (POTENTIAL) CELLS:** For use with potentiometers requiring an external cell; each supplied with Eppley Laboratories certificate. Complete listings in Catalog E.

### GALVANOMETERS AND DYNAMOMETERS

Include d-c galvanometers, both moving-coil and moving-magnet types; a-c galvanometers; and astatic dynamometers. Standard instruments cover almost the entire range of applications. There is at least one to meet usual needs for a balance-point detector in potentiometer or bridge measurements, or for calibrated deflection measurements. Usually, the system is an easily interchangeable unit; one galvanometer with extra systems can often serve for a wide range of measurements.

D-C Moving-Coil Galvanometers are available in a variety of reflecting or pointer types. Many reflecting galvanometers are used with either telescope or lamp, and detached scale, for reading deflections. Among these is the

Type P, of simple, visible construction and with internal parts which are accessible for maximum value in educational laboratories. Some are especially designed for ballistic use. Reflecting galvanometers also are supplied with enclosed lamp and scales. Of these models, the new, compact Type E combines high sensitivity with an exceptionally short period. The available pointer galvanometers not only are rugged to withstand shocks, but also offer short periods and reading convenience.

A-C Moving-Coil Galvanometers, in reflecting and pointer types, are used on 60-cycle circuits. Two astatic dynamometers are available for measurements of voltage, current, and power—and for power factor by the phase-defect method.

For a complete discussion of the characteristics and fundamental principles of these instruments, ask for a copy of our 48-page, pocket-size Note Book ED2(1). **Notes on Moving Coil Galvanometers.** For a catalog, ask for:

Galvanometers and Dynamometers... Catalog ED

### D-C AND A-C BRIDGES

For general measurements of resistance and impedance, and for a number of specific quantities which can be measured in terms of resistance or impedance, we build a varied line of d-c and a-c bridges. For many applications, you'll find a suitable, standard model... either among those for research, teaching and testing; or among our industrial-type indicators, recorders and controllers.

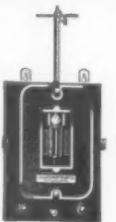
For high or moderate precision measurements of resistance above one ohm, we supply a variety of d-c Wheatstone Bridges—enclosed switch type, open switch type, and plug-type. Of the table models, the Post-Office Pattern Bridge with engraved circuit on the top plate is widely used for student instruction. Among portables is the Type S for ordinary measurements of resistance in lab, shop, and field. More specialized is the handy, compact Type U Test Set for fault location. To locate faults in power cables at low voltages by the Murray Loop method, a Power Cable Fault Bridge is available.

For low resistance measurements below one ohm, Kelvin Bridges are supplied in table and portable models. The Students' Bridge is widely used for teaching purposes.

For extremely high-precision temperature measurements by the electrical resistance-thermometer method, the Type G-2 Mueller Bridge is supplied; Type G-1 Mueller Bridge is available for somewhat less precise measurements. We also offer several portable models for moderately-precise measurements by this method.

Separate d-c ratio boxes and slidewires can be used in various bridge assemblies.

To measure inductance, capacitance, resistance and related a-c quantities at commercial, audio and higher frequencies, we supply a varied line of reliable a-c bridges. To determine concentrations of acid, alkali-



Type P  
Galvanometer



Type E  
Galvanometer



Anthony-Pattern  
Wheatstone Bridge



Open-Dial-Switch  
Wheatstone Bridge



Students'  
Kelvin Bridge

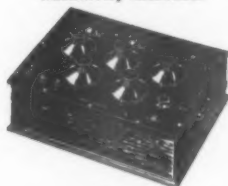


Type U Test Set





Portable Conductivity  
Resistivity Indicator



Wenner  
Potentiometer



Students'  
Potentiometer



Type K-2  
Potentiometer



White Single  
Potentiometer

line, and salt solutions, we offer a choice of general-purpose and specialized a-c Wheatstone Bridges. For extremely precise measurements of electrolytic conductivity, the Jones Conductivity Bridge is usually recommended. There are also portable indicators to provide moderately-precise measurements. Other equipments can be assembled from standard L&N instruments.

A Shielded Capacitance and Conductance Bridge is available for determining power factor. Portable Frequency Indicators also are available. There is a wide choice of accessories for all d-c and a-c bridges. See Catalog E.

#### POTENTIOMETERS

To determine emf as precisely as a given measurement demands, you can choose from a well-rounded line of L&N instruments, each of which applies the basically-sound potentiometer principle in a thoroughly reliable construction. Adjustments of slidewire uniformity, of resistor equality and of each potentiometer as a whole are made within conservatively safe limits. Each is a well-built, thoroughly-tested assembly on which the user can depend for full stability and reproducibility of measurements made within definitely guaranteed error limits.

For highly precise measurements of low voltages, primarily with thermocouples, the Wenner Thermocouple Potentiometer is recommended. Also available for precise calorimetric measurements, or other temperature and temperature-difference measurements, are the White Potentiometers, Single and Double.

For usual high-precision requirements, the Type K-2 Potentiometer, a three-range instrument is recommended. It has an additional low range especially useful for thermocouple work, and for checking standard cells and other potentiometers. The Type K-1 Potentiometer can be supplied where a double-range precision potentiometer is needed for general lab use.

Where a simplified, moderate-precision potentiometer is needed for educational and general lab use, the Students' Potentiometer can be supplied.

To check thermocouple pyrometers and for general temperature measurements, several Portable Indicators are avail-



Portable Millivolt  
Indicator



Glass-Electrode pH  
Indicator

able in single and double-range models. Handy to carry and calibrated in millivolts, they can be used with any type of couple.

For body-temperature measurements with hypodermic and skin-surface thermocouples, there is a Portable Body-Temperature Indicator which is calibrated in degrees.

Compact, portable pH instruments which combine lab accuracy with speed and convenience include the Universal pH Indicator and the Glass Electrode pH Indicator. Both are direct-reading in pH, and are usable with glass electrodes. The Universal Indicator can also be used for pH measurements by means of any other widely used electrode.

For rapid testing of ammeters, voltmeters, wattmeters, and lamp-efficiency, two Brooks Deflection Potentiometers are available.

Volt boxes, shunts and other accessories are also supplied.

#### PHOTOMETERS

Macbeth Illuminometer is compact, portable, for measuring illumination; also available are bar photometers, visual and photoelectric sphere photometers, and distribution photometers. Write for information.

#### PRIMARY ELEMENTS, ACCESSORIES, SUPPLIES

For various applications there is a wide choice of primary elements: for temperature—thermocouples and resistance thermometers; for pH—reference, glass, quinhydrone, and hydrogen gas electrodes; for electrolytic conductivity—laboratory and industrial conductivity cells. Primary elements, accessories and supplies, are listed in Cat. E. See also:

Thermocouples—Assemblies, Parts and Accessories . . . Catalog NS2  
pH Electrodes—Assemblies, Parts and Accessories . . . Catalog EN-55  
Keys and Switches . . . Catalog EU2  
Operating Supplies for L&N Equipments . . . Catalog ENT-W

#### MISCELLANEOUS APPARATUS

For chemical analysis of organic or inorganic compounds by the dropping-mercury electrode method, the unusually stable Electro-Chemograph Type E enables technicians to obtain highly accurate records with convenience and speed. There are also two microphotometers for convenient spectrographic analysis.

Other specialized equipments facilitate certain routine tests: characteristics of magnetic materials; ratio and phase-angle of instrument transformers; specific inductive capacity and power factor of solid and liquid dielectric materials; insulation resistance; etc. Described in Catalog E; further details in:

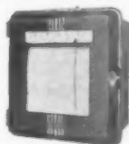
Silsbee Current Transformer Test Set . . . Bulletin E-50-501(1)  
Potential Transformer Test Set . . . Catalog E-50-501(2)  
Insulation Resistance Test Set . . . Catalog E-54-460(1)  
Modified Schering Bridge for Measurements of Dielectric  
Characteristics of Commercial Frequencies . . . Catalog E-54(2)  
Knorr-Albers Microphotometer . . . Catalog E-90(1)  
The Vincent Sawyer Microphotometer . . . Reprint E-90(1)  
Electro-Chemograph Type E . . . Catalog EM-90(1)  
L&N Bibliography of Polarographic Literature . . . Bibliography E-90(1)



Electro-Chemograph  
Type E

### MANY LABORATORY APPLICATIONS REQUIRE AUTOMATIC INSTRUMENTS

#### MICROMAX



Model S  
Micromax or  
Speedomax



Model R  
Micromax



Model C  
Micromax

Strip-Chart Model S records 1, 2, 3, 4, 5, 6, 8, 10, 12 or 16 points, in as many as 6 colors, on a wide, easily-read chart. Indicates on a straight scale. Supplied to measure temperature, pH, electrolytic conductivity, speed, or any one of numerous other quantities. Can operate signals, and simple or elaborate controls. For further details, see Catalog ND44(1).

Round-Chart Model R indicates temperature (or other quantity) with great clarity on a circular scale 28" in calibrated length. Draws a record on a convenient 24-hour circular chart. Can operate signals and simple or elaborate controls. See Catalog ND44(2) for details.

Non-Recording Model C is used where a controller need draw no record. Red pointer indicates control point; black one indicates operating temperature. Details are given in Catalog ND44(3).

#### SPEEDOMAX TYPE G

Strip-Chart Model S rapidly records one point of pH or as many as 16 unusually fast-changing temperatures. Can be supplied to operate signals, alarms and controls. See Catalog ND46(1).

Round-Chart Model R clearly indicates an unusually fast-changing point of temperature or pH and records on a circular chart. See Catalog ND46(1).

Model D Indicator enables operator to read successive temperatures faster than ever before. For details, Catalog ND46(1).

#### SPEEDOMAX TYPE A

Speedomax Type A is used where temperature (or certain other conditions) should be recorded with exceptional speed . . . even faster than that provided by Speedomax Type G. Information on request.



Model R  
Speedomax



Model D  
Speedomax  
Indicator

# THE UNITED STATES STONWARE CO.

Works (Since 1865): Akron, Ohio

NEW YORK OFFICE: 60 East 42nd Street

CHICAGO: 20 N. Wacker Drive

## ACID-PROOF PIPING

Our Acid-Proof Chemical Stoneware Pipe and Fittings are made of de-aired (vacuumized) clays. All pipe lengths are straight, even and round, thus facilitating erection. In the bell-and-spigot type, the hubs are all 4" deep and both the spigot and hub ends are deeply corrugated. Every piece is accurately moulded and as true to dimensions as can be made by master-craftsmen highly skilled in the ceramic art. The joints may be sealed with our "CALKTITE" Acid-Proof Caulking Compound and on special order, we can furnish B&S Piping with our patented "TYLOX" Rubber Joints.

Would you like us to send you a copy of Bulletin No. 550 on Acid-Proof Piping? It's filled with a wealth of engineering and technical data, authoritative information on the most modern pipe caulking methods, installation techniques, etc. Free on request.

## ACID-PROOF CHEMICAL STONWARE LABORATORY SINKS

"U. S. Standard" Acid-Proof Sinks are widely used in laboratories of universities, schools, hospitals and industrial companies.

The construction is **one-piece**, without seams or joints. The material is non-porous and non-absorbent. The corners are well-rounded and the surface smooth. Special sizes can be made to fit any desired space.

**Glaze**—Our "Hy-Gloss" salt glaze has a high lustre, dark brown finish and is an integral part of the body itself.

**Guarantee**—Our products are unconditionally guaranteed to be acid, alkali and corrosion-proof throughout the body, with or without the salt glaze. **We make all Laboratory Sinks of our special and exclusive "Ceratherm 500" heat-shock resistant body, thus enabling their use with boiling water, etc.**

**Bulletin**—Write for Bulletin No. 505 giving full information.

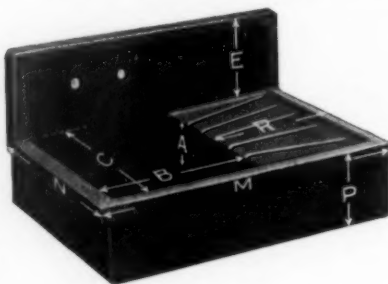
## ACID-PROOF SINKS WITH INTEGRAL DRAINBOARDS

(One-piece)

Fig. 533-ASP (with Countersunk Outlet to take Metal Plug).

Fig. 533-BSP (with Integral Nipple Outlet and Removable Strainer).

Fig. 533-CSP (with Integral Nipple Outlet and Built-in Lute Trap).



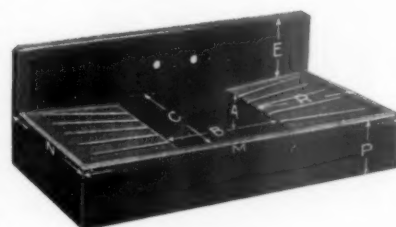
Size No.	B	O	A	E	M	N	P	R	Shipping Wt., Lbs.	Code Word
307	18	14	7	8	37 1/2	16 1/2	8 3/4	18	197	Tong
312	20	16	7	10	39 1/2	18	9 1/4	18	285	Tope
313-A	24	18	8	10	43 1/2	21	10 1/4	18	348	Tory
315	30	20	8	10	49 1/2	23	10 1/4	18	410	Tuch

Sinks are made with drainboards at right hand or left hand. Special end table sinks can be made up with back cut out for trough drainage. Corner sinks with double integral back and sinks without integral backs can also be supplied.

Fig. 536-ASP (with Countersunk Outlet to take Metal Plug).

Fig. 536-BSP (with Integral Nipple Outlet and Removable Strainer).

Fig. 536-CSP (with Integral Nipple Outlet and Built-in Lute Trap).



Size No.	B	O	A	E	M	N	P	R	Shipping Wt., Lbs.	Code Word
507	18	14	7	8	54	16 1/2	8 3/4	18	284	Trew
512	20	16	7	10	56	19	9 1/4	18	402	Trig
513-A	24	18	8	10	60	21	10 1/4	18	477	Trow
515	30	20	8	10	66	23	10 1/4	18	546	Tude

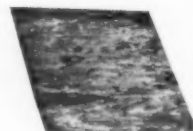
Special end table sinks can be made up with back cut out for trough drainage. Corner sinks with double integral back and sinks without integral backs can also be supplied.

## TYGON FLEXIBLE PLASTIC TUBING



Used by leading laboratories the world over. Tygon flexible plastic Tubing is clear for ready solution visibility; flexible for simple and easy connections; tough and non-oxidizing for long, economical life. Will handle practically all chemical solutions found in college chemical labs. Available in a wide range of sizes at all leading laboratory supply houses.

## PLASCOR PLASTIC FLOOR TILE



The ideal flooring for college and university laboratories: comfortable and quiet under foot; possesses excellent resistance to acids, alkalis, alcohols, oils, water. Made from Tygon plastic and cork. Economical to install; remarkable wear life. Wide range of colors.

# METALAB EQUIPMENT CORP.

270 Duffy Avenue  
Hicksville, New York

OFFICES IN PRINCIPAL CITIES

## NEW HORIZONS

*In*

EDUCATIONAL  
LABORATORIES



## SECTIONAL

## LABORATORY FURNITURE and EQUIPMENT

**METALAB Equipment** is a product engineered specifically to **withstand continuous wear and hard usage in busy laboratories.** Being constructed of chemically resistant, enamelled, lead-coated steel and stone, it is **rugged, fireproof, waterproof, and corrosion resistant.**

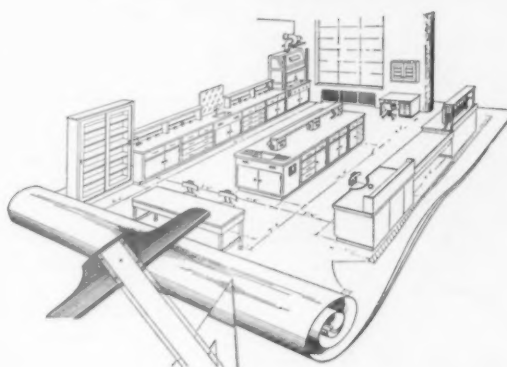
**Industrial Research, Development and Control** are making great strides, and **METALAB** equipment will be found in many of the nation's outstanding laboratories and institutions. The same inherent quality features of this equipment are incorporated in our **Educational Line.**

The ingenious **Sectionalized Unit** system, which offers maximum flexibility of arrangement at a modest cost, will be helpful to your budget. Assure yourself of the finest and most modern laboratory equipment for your project. **Specify METALAB!**



**ENGINEERING SERVICE:** Send your layout problems to **METALAB** for recommendations and proposals. We will suggest ways and means of increasing laboratory classroom efficiency with the aid of modern equipment. **This service involves no obligation on your part.**

Write on your letterhead for your copy of the new, complete METALAB catalog!



The **METALAB** line of **School Laboratory Equipment** is complete and includes the following:

- **TABLES** — Science, Physics, Chemistry, Biology, Home Economics, Manual Arts, Geology, Lecture, Demonstration, Instructors, Balance, Dark Room, Developing, Bacteriology, Microscope, Medical, Research, Private Laboratory, etc.
- **CASES AND CABINETS** — Chemical, Apparatus, Instruments, Glassware, Microscope, Museum, Specimen, Acid Storage, Map and Chart, etc.
- **CHEMICAL FUME HOODS** (Open and Closed Types) — Complete with exhaust fans and ducts.
- Also Acid-Proof Sinks, Tanks and Special Laboratory Fittings and Accessories.





# WESTINGHOUSE ELECTRIC CORPORATION

Plants in 25 Cities

Offices Everywhere

METER DIVISION

NEWARK, NEW JERSEY

## A COMPLETE LINE OF INSTRUMENTS FOR LABORATORIES

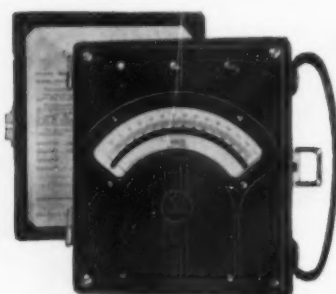
- Portable Testing Instruments
- Switchboard and Panel Instruments

- Oscillographs and Recorders
- Auxiliary Equipment

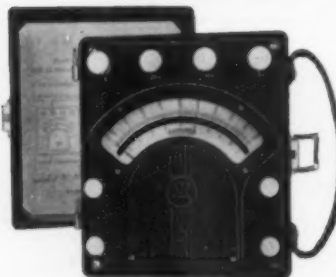
Westinghouse electrical instruments meet the exacting needs of university and college laboratories for scientific instruction . . . long life . . . accuracy . . . diversified application.

Illustrated and discussed here is a representative selection of electrical measuring instruments: portable, switchboard and panel types, recorders

and oscillographs, shunts, resistors and portable transformers. For more detailed information and for recommended lists of instruments for various kinds of laboratories, call your nearest Westinghouse office or write for Booklet B-3664, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.



Type PX-5 D-C Voltmeter



Type PA-5 A-C Ammeter

Type PX-4 D-C  
Double-range  
VoltmeterType PY-4 A-C  
Triple-range  
Voltmeter

### PORTABLE INSTRUMENTS

#### TYPE P-5 LINE (Accuracy 1/2%)

The Type P-5 Series of Westinghouse instruments can withstand the severe portable service of constant laboratory use, and still maintain the highest degree of accuracy over long periods of time. The combination of high-grade mirrored dials and knife-edge pointers eliminates parallax and assures accurate reading. *Scale length is 5 inches*, and divisions are arranged to aid quick reading. Maximum versatility is achieved with multi-range scale, some of which incorporate seven ranges. Stray magnetic fields do not impair accuracy. *Movements* are mounted on moulded face plate for quick, easy dismantling for inspection and study in the classroom or laboratory. *Pre-aged Moldarta case* does not warp or deteriorate from age, hard service or weather conditions.

(For Complete Ordering Information, See Catalog Section 43-100)

FULL SCALE RANGE OF STANDARD RATINGS			
TYPES PA-5 AND PY-5 FOR ALTERNATING CURRENT		TYPE PX-5 FOR DIRECT CURRENT	
AMMETERS	0.5 to 0-200	AMMETERS	0.05 to 0-50
MILLIAMMETERS	0.10 to 0-750	MILLIAMMETERS	0.03 to 3,000
VOLT-AMMETERS	0.75 to 0-750 volts 0.1 to 0-25 amps	MICROAMMETERS	0.10 to 0-750
VOLTMETERS	0.3 to 0-750	VOLT-AMMETERS	0.3 to 0-150 volts 0.03 to 0-30 amps
WATTMETERS	0.20 to 0-30,000	MILLIVOLTMETERS	0.2 to 0-2,000
		VOLTMETERS	0.1 to 0-1500

#### TYPE P-4 LINE (Accuracy 1/4%)

The Type P-4 Westinghouse line of portable instruments is designed for operating convenience. (Case measures only 4 1/2" x 4 1/2" x 2".) They may be easily disassembled for inspection and classroom instruction, and are well adapted for laboratory work. *Lightweight*: a-c instruments weight only 2 pounds; d-c instruments, 3 to 4 pounds. *Moldarta Case* is lightweight, non-warping, weather-resisting.

(For Complete Ordering Information, See Catalog Section 43-100)

FULL SCALE RANGE OF STANDARD RATINGS			
TYPE PY-4 FOR ALTERNATING CURRENT		TYPE PX-4 FOR DIRECT CURRENT	
	AMMETERS	AMMETERS	0.1 to 0-50
	MILLIAMMETERS	MILLIAMMETERS	0.5 to 0-750
	VOLTMETERS	VOLTMETERS	0.1 to 0-750
TYPE PY-4 FOR DIRECT CURRENT	AMMETERS	Rectifier type	0.1 to 0-750
	Radio frequency	MILLIVOLTMETERS	0.5 to 0-150
	MILLIAMMETERS	MILLIVOLTMETERS	0.2 to 0-100
	Radio frequency	VOLT-AMMETERS	0.15 to 0-150 volts
	Rectifier type		0.15 to 0-60 amperes
(Also Radio-frequency and Rectifier Types)	MICROAMMETERS		
	Rectifier type		

**TYPE P-14 LINE (Accuracy 1%)**

The Type P-14 portable instrument includes the features of the larger portables, including magnetic shielding, plus the added advantages of extremely light weight and smaller overall dimensions. Its accuracy, versatility and low cost make it ideal for field and radio testing, and for general student laboratory work. **Maximum Versatility:** Up to 4 voltage ranges or 4 current ranges available with multi-range scales. Combinations such as three current and three voltage ranges in the same instrument make this one of the most versatile instruments available. **Maximum Portability:** Measuring only  $5\frac{3}{4}" \times 4\frac{1}{4}" \times 2\frac{1}{2}"$ , both the hinged cover type and the open-face model are small enough to fit a pocket. **High Overload Capacity:** Type P-14 instruments will withstand exceptionally high overload shocks.

(For Complete Ordering Information, See Catalog Section 43-100)

FULL SCALE RANGE OF STANDARD RATINGS			
TYPE PA-14 FOR ALTERNATING CURRENT		TYPE PX-14 FOR DIRECT CURRENT	
VOLTMETERS	0-1.5 to 0-750	VOLTMETERS	0-.75 to 0-800
AMMETERS	0-.5 to 0-50	MILLIVOLTMETERS	0-10 to 0-5,000
MILLIAMMETERS	0-5 to 0-500	AMMETERS	0-.5 to 0-50
Also available in rectifier and thermocouple types.		MILLIAMMETERS	0-1 to 0-2,000
		MICROAMMETERS	0-20 to 0-5,000

**TYPE P-12 LINE (Accuracy 2%)**

The Type P-12 line includes single and multiple range ratings for complete D-C and A-C current and voltage measurements. It meets all the performance requirements, including shielding, insulation, etc., required for 2% portable instruments in A.S.A. C39.1. Although it is the smallest and lowest cost of the Westinghouse portable instrument lines, it provides the same high degree of reliability, overload capacity and range coverage that are contained in the larger types.

**Lightweight:** A-C instruments, weigh from 1 to  $1\frac{1}{2}$  lbs.; D-C instruments from  $1\frac{1}{2}$  to 2 lbs.

**Pocket Size:** A-C— $4\frac{1}{4}" \times 3\frac{3}{4}" \times 2\frac{5}{16}"$ ; D-C— $4\frac{1}{4}" \times 3\frac{3}{4}" \times 1\frac{3}{4}"$ .

(For Complete Ordering Information, See Catalog Section 43-100)

FULL SCALE RANGE OF STANDARD RATINGS	
TYPE PA-12 FOR ALTERNATING CURRENT	TYPE PX-12 FOR DIRECT CURRENT
Self Contained Current — From 5 milliamperes to 50 amperes	Self Contained Current — From 20 microamperes to 50 amperes
Self Contained Voltage — From 1.5 volts to 300 volts	Self Contained Voltage — From 10 millivolts to 800 volts
Also available in rectifier types.	

**ANALYZERS**

**TYPE TA—FOR A-C CIRCUITS (Accuracy: ammeter, voltmeter, 1%; wattmeter, 2%) Measures Volts, Amperes, Watts and Power Factor**

The Westinghouse Type TA Industrial Analyzer incorporates in one compact, portable case all instruments necessary to obtain complete operating data of alternating current circuits up to 600 volts, 125 amperes. It is self-contained, eliminating need for carrying individual instruments and accessories to the job. Wiring set-up consists of simply connecting to power circuit and to the apparatus under test. Switches permit shifting ammeter and voltmeter to check all lines of a three-phase circuit under load. Instruments are placed close together to permit accurate, almost simultaneous readings.

(For Complete Ordering Information, See Catalog Section 43-100)

**TYPE TX—FOR D-C CIRCUITS (Accuracy: voltmeter and ammeter, 1%) Measures Volts, Amperes and Ohms**

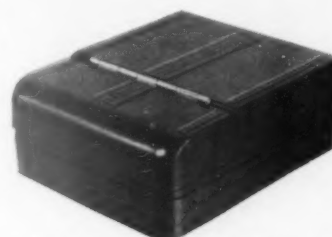
The Type TX Analyzer obtains complete running performance data of d-c motors, generators and controls without the necessity of setting up individual instruments, multipliers and shunts. Great volumes of wiring for test set-ups is eliminated, making the instrument most practicable for laboratory work. Simultaneous reading of various quantities may be more accurately obtained by the compact arrangement of the instruments. Tests d-c motors up to 600 hp, 750 volts, 750 amps.

(For Complete Ordering Information, See Catalog Section 43-100)

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



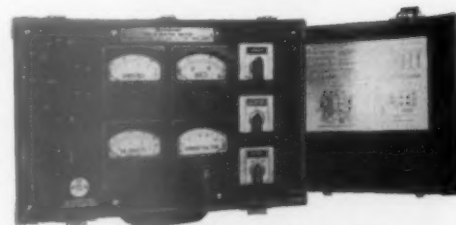
Type PX-14 open-face model. A separate binding post is provided for each range of a multi-range scale



Hinged cover, optional on either PX-14 or PA-14 models, assures full protection



Type PX-12 D-C Ammeter



Type TA A-C Industrial Analyzer



Type TX D-C Industrial Analyzer

## SWITCHBOARD INSTRUMENTS

### 24-LINE (Accuracy 1%)

**4½" Class—Circular Scale, Rectangular Front—Round-body Case for Flush Mounting.** Because of its extra-long scale, the 24-Line instrument combines high readability with minimum panel space requirements, particularly useful where panel area is at a premium. The pointer travel gives a scale length more than twice as long as other types which require the same panel space.

### 25-LINE (Accuracy 1%)

**6" Class—Rectangular Case—Flush or Projection Mounting—Optional Internal Illumination.** Westinghouse 25-Line instruments meet the requirements of many special installations. Simplicity of design, uniform appearance, interchangeability and availability of movements for any measurements, make this instrument especially suited for modernization as well as for new installations. All terminals are mounted near the vertical center line, permitting instruments to be mounted near the edge of a panel without interfering with supporting posts and wiring channels.

(For Complete Ordering Information, See Catalog Section 43-200)

#### FULL SCALE RANGE OF STANDARD RATINGS—24 and 25 Lines

DIRECT CURRENT	ALTERNATING CURRENT
Ammeters—0-1 to 0-50 (self-contained)	Ammeters—(24 line)—0-1 to 0-20 (self-contained)
Ammeters for use with shunts—0-50 or 0-100 millivolts	(25 line)—0-1 to 0-50 (self-contained)
Voltmeters—0-2 to 0-800 (self-contained)	Ammeters for use with transformers—0-5
Milliammeters—0-1 to 0-500	Voltmeters (24 line)—0-150 to 0-600 (self-contained)
Wattmeters—120 or 240 volts, 0-50 or 0-100 millivolts for external shunts. (25 line only)	(25 line)—0-15 to 0-800 (self-contained)
	Voltmeters for use with transformers—150
	Wattmeters for use with transformers—5 amperes—120 volts
	Synchrosopes—120 volts
	Power Factor meters—5 amperes, 120 volts, 0-1-0 scale
	Frequency meters—(24 line)—120 volts, 60 cycles
	(25 line)—120 volts, 25 or 60 cycles



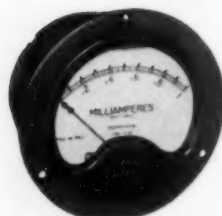
Type K-24 circular scale d-c voltmeter



Type U-25 projection-mounted voltmeter



Type N-33, flush-mounting, wide flange



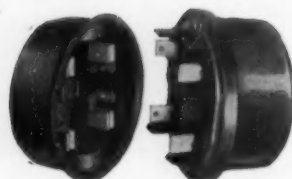
Type N-35, flush mounting



Type N-37, flush mounting



Type E, showing simple but positive connection by plugs



## MINIATURE PANEL INSTRUMENTS

### 33-LINE (Accuracy 2%)

**2½" Class—Scale Lengths, 1.5" to 1.8".** Five flush mounting types of cases are available: the American War Standard; the round, wide-flange instrument; the round, narrow-flange type; the rectangular type. Projection mounted instruments also are available in round case. Cases are interchangeable.

### 35-LINE (Accuracy 2%)

**3½" Class—Scale Lengths, 2.06" to 2.4".** Available as a complete line in five types of cases and mounting covering all laboratory, industry and radio applications. The ratings cover the broadest field consistent with prevailing requirements for instruments of this class. Cases are interchangeable without adapters.

### 37-LINE (Accuracy 2%)

**4½" Class—Scale Lengths, 2.8" to 3.2"** The largest of the miniature panel instruments. The self-contained ratings cover the broadest possible field for this class of instruments. Higher ratings may be obtained by using external resistors, shunts or transformers. Five types of cases are interchangeable throughout the line.

(For Complete Ordering Information, See Catalog Section 43-300)

#### FULL SCALE RANGE OF STANDARD RATINGS—TYPES 33-35-37

DIRECT CURRENT		MILLIAMMETERS	
AMMETERS	0-1 to 0-50	(For frequencies of 15 to 500 cycles)	0-5 to 0-500
MILLIAMMETERS	0-1 to 0-800	Rectifier	0-1 to 0-10
MICROAMMETERS	0-20 to 0-800	Radio Frequency	0-10 to 0-800
VOLTMETERS	0-1 to 0-800	MICROAMMETERS	
MILLIVOLTMETERS	0-10 to 0-500	Rectifier	0-100 to 0-500
ALTERNATING CURRENT		VOLTMETERS	
AMMETERS		(For frequencies of 25 to 125 cycles)	0-1.5 to 0-800
(For frequencies of 15 to 500 cycles)	0-1 to 0-50	Rectifier	0-3 to 0-300
Radio Frequency	0-1 to 0-20	DB METERS	
		Rectifier	Standard Scales

## SOCKET INSTRUMENTS

### 6" CLASS—E-Line (Accuracy 1%)

Type E socket instruments provide a low cost means of checking load and machinery operation. One instrument can be used to check circuits at a number of places. Sockets may be mounted directly on conduits. After socket is installed, instruments may be plugged in or replaced quickly. Scale is 5¼", with bolt figures and target pointers to make reading easy at a distance. Temporary overloads do not harm the movements; no short-circuiting connections are necessary.

(For Complete Ordering Information, See Catalog Section 43-600)



## TYPE PA UNIVERSAL OSCILLOGRAPH

The Westinghouse Oscillograph measures instantaneous electrical quantities visually, or photographically, or both simultaneously throughout a frequency range from zero or continuous quantity to 10,000 cycles per second. It is possible to view and record any one or all of the following quantities on one record . . . volts, millivolts, amperes, milliamperes, microamperes, poly-phase or single-phase watts, frequencies up to 10,000 cycles.

There is one design of the main case. It is arranged to carry up to four control panels of a choice from seven and up to seven galvanometers of a choice from nineteen. Three different types of film holders are available. This flexibility allows the interchanging of elements and panels to meet new requirements and does away with the necessity for completely different oscillographs to meet widely different needs.

Exacting developments and studies in electrical as well as mechanical equipment frequently require the use of the Westinghouse Oscillograph.

The main case is divided in two levels. The top level consists of the Oscillograph proper . . . optical system with the galvanometers. The lower level houses the controls for the galvanometers as well as the controls for the lamp filmholders and simultaneous viewing attachment. Filmholder, lamp and motor are mounted outside case.

(For Complete Ordering Information, See Catalog Section 43-510)



Type PA Universal Oscillograph



Oscillograph mounted on mobile steel table for laboratory

## RECORDING INSTRUMENTS

### TYPE G-40 DIRECT ACTING STRIP CHART RECORDER (Accuracy 1%)

Perfection of detail in chart drive, chart reroll, chart threading and inking system, makes Type G-40 Recorders easier to operate and has removed many causes of lost records. Available for switchboard or portable applications.

The chart and clock mechanism are readily removable without disturbing the instrument movement or any connections to the instrument. Recording pen has a long-wearing, platinum-iridium point. Chart has double perforations for positive traction on driving drum. Accurate synchronous motor clock, furnishes drive power for chart. Chart speeds of  $\frac{3}{4}$ ",  $1\frac{1}{2}$ ", 3" or 6" per hour or per minute. An electronic-type recorder is also available in the G-40 line for the recording of low-energy values.

(For Complete Ordering Information, See Catalog Section 43-400)



Type G-40 Recorder and Portable service

### TYPE A ROUND CHART RECORDER (Accuracy 2%)

A low first-cost, low-maintenance recording instrument for a variety of applications where chart records of 2% accuracy are adequate for their purpose. Extra-sturdy construction makes this a convenient instrument for miscellaneous jobs. Portable, switchboard mounting, wall mounting or detachable socket-mounting cases are available. Scale length is 2 inches, but chart has suppressed zero scale with divisions comparable in size and readability to those of much longer scales. Charts are available for one-revolution-per-day or one-revolution-per-week operation. High-grade paper used makes charts stay flat.

(For Complete Ordering Information, See Catalog Section 43-400)



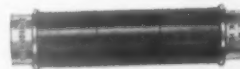
Type A Recorder for switchboard mounting

## AUXILIARY EQUIPMENT

### SECTIONAL TUBULAR RESISTORS FOR D-C INSTRUMENTS

The sectional construction of these resistors permits a wide range of accurate measurements of high voltages with one milliampere instruments. Resistance values  $\frac{1}{4}$ ,  $\frac{1}{2}$ ,  $\frac{3}{4}$  or 1 megohm are standard, and combinations of these are used to form the complete unit. They are designed for panel mounting or portable use.

(For Complete Ordering Information, See Catalog Section 43-800)

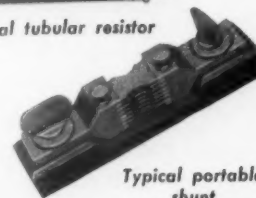


Sectional tubular resistor

### TYPE G AND GG SHUNTS FOR D-C MEASUREMENT

Type G and GG shunts provide a complete line for use with indicating or recording instruments for measuring direct currents beyond the range of self-contained instruments. Accuracy is maintained by special manganin alloy strips which are unaffected by temperature. Portable and switchboard types are available in 50 and 100 millivolt sizes with many different current ratings.

(For Complete Ordering Information, See Catalog Section 43-800)



Typical portable shunt

### PORTABLE POTENTIAL AND CURRENT TRANSFORMERS

For measuring electrical quantities greater than the self-contained ranges for which the instruments are rated, these portable potential and current transformers offer a convenient and accurate means of increasing the usefulness of an instrument.

High overload capacity of multiple ratio current transformers permit safe use of continuous loads up to 200%. Potential transformers, available with three primary ratings, can be loaded safely up to several hundred percent.

(For Complete Ordering Information, See Catalog Section 43-800)



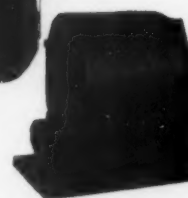
Type PC-137 current transformer

### TYPE A-80 NONSPARKING A-C TACHOMETER

Type A-80 tachometer combines an induction type generator and a rectifier indicating instrument. It has no commutator and no brushes, and with sealed-in type bearings which require no lubrication for life, practically eliminates maintenance.

(For Complete Ordering Information, See Catalog Section 43-800)

Type A-80 a-c tachometer with mounting bracket



# GENERAL RADIO COMPANY

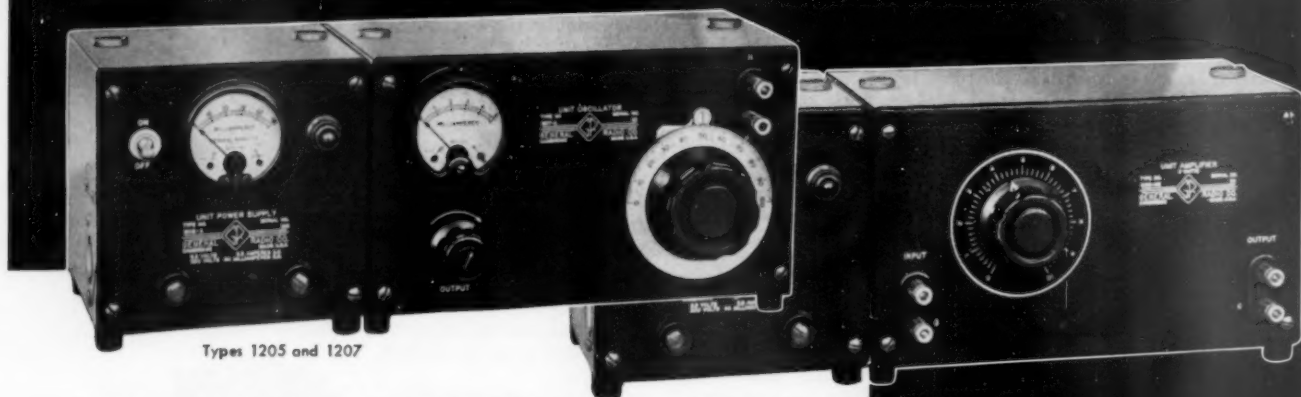
Cambridge 39, Massachusetts

90 West St., New York 6

920 S. Michigan Ave., Chicago 5

1000 N. Seward St., Los Angeles 38

## UNIT INSTRUMENTS



Types 1205 and 1207

Types 1205 and 1206

**PLUG-IN • VERSATILE • INEXPENSIVE**

THE new G-R line of unit instruments — each complete in itself, with straightforward circuit, good accuracy and adequate shielding — provide a means for acquiring the basic measuring instruments for any small electronics laboratory with the minimum financial outlay.

These units are especially valuable in the college laboratory. All of the circuit components are permanently mounted in small, rigidly-constructed cabinets with open wiring which can be modified by students into a wide variety of typical circuits, and then restored to their original design with the minimum of time. Adequate metering is supplied. The accuracies are sufficient for a very large number of routine laboratory measurements, including use with various bridge circuits.

The power supply plugs into each unit, automatically furnishing the latter with proper filament and plate voltages. An accessory Jones plug is furnished so that customer-built units may be plugged into the power unit.

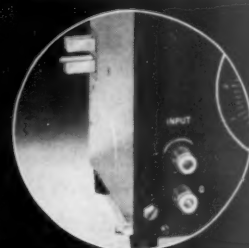
**Type 1205-A Unit Power Supply** This unit supplies output voltages of 6.3 volts at 2.5 amperes and 300 volts dc at 50 ma. The hum level is 0.8 volt at maximum output load. Connections to the associated unit equipment are made through a multipoint connector mounted in the ends of the instrument. An extra connector is supplied for use with other equipment. **Price: \$55.00**

**Type 1206-A Unit Amplifier** This amplifier uses two triode voltage-amplifier stages and an impedance-coupled output stage. It has a maximum voltage gain of 45 db with a maximum output of 30 watts. The frequency response is essentially flat from 100 cycles to 100 kc. Above 100 cycles the distortion is less than 2% with 1 watt into a 7500-ohm load. **Price: \$65.00**

**Type 1207-A Unit Oscillator** With separately available, high-Q plug-in coils this oscillator produces a test signal at frequencies from 400 cycles to 80 Mc at  $\frac{1}{2}$  watt maximum output. Seven plug-in coils provide continuous frequency coverage from 70 Kc to 80 Mc. Three fixed-frequency coils supply audio frequencies at 400, 1000 and 20,000 cycles. A blank coil is furnished with each instrument. The frequency stability is adequate for most routine laboratory uses except when highly selective tuned circuits are involved. **Price: \$73.00**



Seven plug-in coils cover the range of 70 kc to 80 Mc; three coils provide fixed frequencies of 400, 1000 and 20,000 cycles. Prices: from \$9.00 to \$19.50 each



Each unit is equipped with a multipoint plug (at rear) to pick up filament and plate voltages from the power supply. Small plug at front insures adequate mechanical connection between separate boxes



THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# Weston Electrical Instrument Corporation

601 FRELINGHUYSEN AVENUE, NEWARK, N. J.

## — WESTON INSTRUMENTS — *The Standard for* INSTRUCTION • RESEARCH • INDUSTRY

Weston Instruments are the accepted standard of dependable measurements in the research laboratory and throughout industry. As such they are essential in the school laboratory and shop.

Weston Instruments provide ruggedness, accuracy and long term dependability. Their use assures trouble-free results, thus fostering academic excellence. Students and instructors working with Weston instruments are equipped with the standards used in the field.

The models listed and described are particularly suitable for school use and can be furnished in all practical ranges. Information on the complete line sent promptly upon request.

### PORTABLE AND PANEL INDICATING INSTRUMENTS—D.C. & A.C. TYPES

Microammeters, Milliammeters and  
Ammeters, Voltmeters, Wattmeters,  
Power Factor Meters, Frequency  
Meters, Galvanometers

### LABORATORY STANDARDS

Voltmeters, Ammeters, Wattmeters

### ACCESSORIES

Shunts, Resistors, Current and Potential  
Transformers, Standard Cells, Rectifiers,  
Thermocouples, \*Photronic Cells

### SERVICE INSTRUMENTS

A.C. Power Analyzer, Clamp Ammeter,  
Circuit Testers, Ohmmeters, Electronic  
Volt-Ohm-Milliammeter, Vacuum Tube  
Testers, Insulation Tester, Light Measuring  
Instruments

### RELAYS

Sensitive (magnetic and non-magnetic  
contact). Power use. Current and  
Voltage types

### PHOTOGRAPHIC EQUIPMENT

Exposure Meter, Photographic  
Analyzer

### TEMPERATURE INDICATING INSTRUMENTS

Electrical Type—Remote indicating  
(Thermocouple and Resistance)  
Bimetallic Type—Laboratory, Industrial

### ELECTRIC TACHOMETERS (SPEED INDICATIONS)

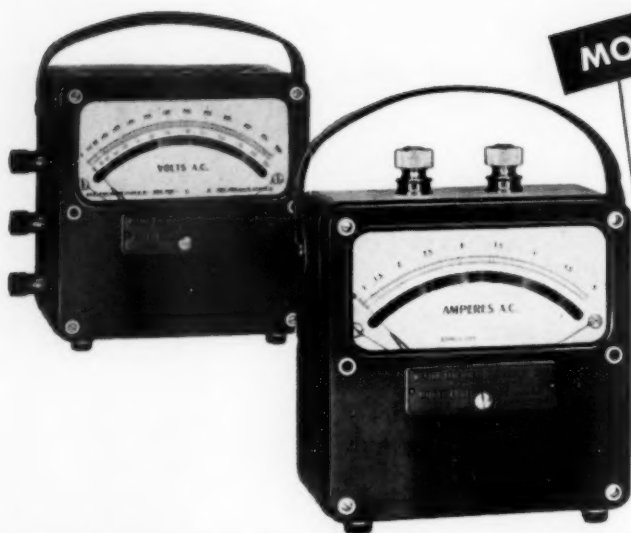
A.C. & D.C. Types—Remote Indicating  
\*Photronic . . . A registered trade-mark  
designating the photo-electric cells and  
devices manufactured exclusively by  
the Weston Electrical Instrument Corporation.







# Instruments for Every Classroom



**MODEL 430 SERIES**

**Portable AC and DC**  
 Voltmeters • Ammeters • Single Phase Wattmeters

Compact, rugged and dependable. Used extensively in technical schools and throughout industry for general test work. All are electromagnetically shielded. Model 931 has a new self-shielding mechanism which provides exceptionally high protection. Large scale openings permit good visibility of the long, hand calibrated mirror scales with knife edge pointers. Contained in molded bakelite cases with leather carrying strap. Size approximately 5-1/16" x 6-1/32" x 3 1/2". Weight approximately 2 1/2 lbs.

## Model 622 AC and DC Ultra Sensitive Instruments



A group of high-sensitivity instruments ideal for precision measurement of low potentials and minute currents. Well suited for multi-range requirements. Available as DC Voltmeters, Millivoltmeters, Milliammeters, Microammeters. AC Thermo Ammeters, Thermo Milliammeters, Thermo Voltmeters also available.

## Model 280 Miniature DC Instruments



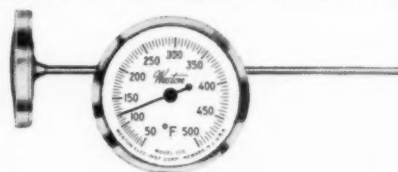
Available in single and multi-range, portable models which are most convenient for student use on a variety of testing. Features are: 1% accuracy, ruggedness, hand calibrated mirror scales, knife edge pointers and magnetic shielding. Size 4-2/5" x 4-3/5" x 1 1/2".

## Model 375 Student Galvanometer



Made in two forms, with or without mounting base. Widely used in school laboratories where dependability and low cost are first considerations. Sensitivity is approximately 22 microamperes per division with a 30-0-30 division scale. Resistance approximately 23 ohms. Models also available with higher sensitivity.

## Model 2261 Testing Thermometers



Bimetal, dial type, 1 3/4" diameter head. Stainless steel throughout. 3.40" scale length, 8" stem length. Ranges as low as -100°F. or -100°C. and as high as 500°F. or 250°C. Accurate within 1/2 of 1% of full scale range in degrees of temperature.

# and Laboratory Requirement



## MODEL 901 SERIES

## Portable AC and DC



New, modern concept in portables with large, curved, shadow reducing windows for brilliant dial illumination, long 5½" hand calibrated, mirrored scales with knife edge pointers ... electromagnetically shielded. DC models have new self-shielding mechanism providing extremely high protection. Styled in ribbed, bakelite cases with carrying strap. Available in DC Voltmeters, Volt-Ammeters, Ammeters, Milliammeters; AC Voltmeters, Ammeters, Milliammeters. Accuracy: ½ of 1%. Also AC Rectifier Type in Voltmeters, Milliammeters. Accuracy: 1½% from 15C to 35C. Size: 7½" x 7¼" x 3⅝". Weight: 3¾ lbs.

### Model 769 Electronic Analyzer

Three-in-one instrument. Provides self-contained Volt-Ohm-Milliammeter, high impedance electronic DC Volt-Ohmmeter, and probe type Vacuum Tube Voltmeter for use to 300 megacycles. Exceptionally stable and accurate. Specially designed extremely small RF and DC Probes.

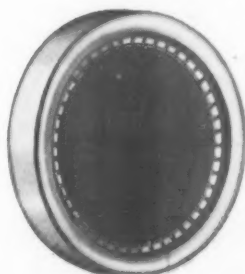


### Model 564 DC Volt-Ohmmeter

Model 564 is an extremely compact instrument which is widely used where testing and experimentation require only DC voltage or resistance measurements. The ranges have been carefully planned to provide the electrical measurements frequently needed for student instruction. Size approximately 5½" x 3⅝" x 2-9/16". Approximate weight 1¾ lbs.



### Model 856 Hermetically Sealed Photronic Photoelectric Cell



Weston Model 856 photoelectric cells are of the barrier-layer, self-generating type, housed in a metal case hermetically sealed against moisture and harmful atmospheric conditions. They combine stability with high sensitivity, and freedom from fatigue.

### Models 489 and 528 Miniature Portable Instruments

For general testing and laboratory work, Weston Model 489 Miniature Portable DC Instruments combine dependability with relatively sensitive operation. Model 528 Companion AC Instruments are also available.



## WESTON PANEL INSTRUMENTS

Design instructors will appreciate the wide selection of Weston panel instrument models. They will fill every requirement for attractive appearance, utility and dependable measurement.



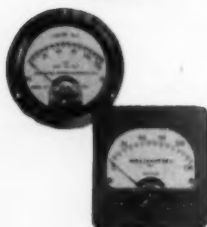
### Model 861 Group—Rectangular

Model 861 and 961 groups are large  $4\frac{1}{4}'' \times 3\frac{1}{8}''$  DC and AC instruments with 3.17" scales. Include Thermo Ammeters and VU Meters. Dial illumination on Model 861 group.



### Model 640 Group—Round

A line of AC and DC instruments available in all practical ranges. Standard case is  $4\text{-}3\frac{3}{8}''$  dia., flush Bakelite. Surface Bakelite and flush or surface metal cases are optional. Scale length 3.34".



### Model 301 Group Round or Rectangular

A group of compact AC and DC panel instruments, measuring approximately  $3\text{-}3\frac{3}{8}''$  dia., available in all required types and ranges. Round shapes furnished with flush Bakelite cases. Rectangulars, flush or surface in either Bakelite or metal.



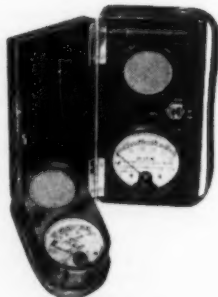
### Model 269 Group—Fan Shape

A very attractive group of wide range DC instruments with the longest scales ever attained for comparable sizes. Accuracy 1%. Available in four scale lengths 2.6"—4"—5.8"—7.32"; and supplied in surface types, black finished steel cases.

## WESTON ILLUMINATION METERS

Model 703, pocket size and entirely self-contained. Measures directly in foot-candles, range 0-75 fc. Available with Viscor filter for measuring all types of lighting direct, regardless of color characteristics.

Model 614, has three ranges, available through range changing switch . . . 0-60/0-120/0-600/foot candles. Also available with the Viscor filter as described above.



## WESTON REPRESENTATIVES

### United States

ALBANY 7—Carse Electric Corp., 100 State St.  
ATLANTA 3—E. A. Thornwell, Inc., 217 Whitehall St., S. W.  
BOSTON 16—Cowperthwait and Bradhead, 131 Clarendon St.  
BUFFALO 3—Cooper-Morgan, Inc., 527 Ellicott Sq.  
CHARLOTTE 2, N. C.—Ranson, Wallace & Co., 116½ E. 4th St.  
CHICAGO 6—Weston Electrical Instrument Corp., Room 1222, 205 W. Wacker Dr.  
CINCINNATI 37—The Beedle Equipment Co., Roselawn Center Building, Reading and Section Roads  
CLEVELAND 14—Ambas-Jones Co., 1085 The Arcade  
DALLAS 6—Butler and Land, 5538 Dyer St.  
DENVER 16—Peterson Company, 4949 Colorado Blvd.  
DETROIT 2—T. S. Cawthorne Company, 570 Maccabee Bldg., Woodward Ave. at Putnam  
HOUSTON 2—Lynn Elliott Company, 322 M & M Bldg.  
JACKSONVILLE 2—Ward Engineering Co., Inc., 1054 West Adams St.  
KNOXVILLE 16, TENN.—A. R. Hough, 15 Nokomis Circle, P. O. Box 1452  
LITTLE ROCK, ARKANSAS—Curtis H. Stout, 215 Commerce St., P. O. Box 107  
LOS ANGELES 27—Edward S. Sievers, 5171 Hollywood Blvd.  
MIDDLETOWN, CONN.—Dittman & Greer, 33 Pleasant St.  
MINNEAPOLIS 2—Goesska & Pinkney, 552-3 Plymouth Bldg.  
NEWARK 5, N. J.—J. R. Hemion, 614 Frelinghuysen Ave.  
NEW ORLEANS 12—W. J. Keller, 304 Natchez Bldg., Natchez and Magazine Sts.  
NEW YORK 7—Weston Electrical Instrument Corp., Room 1775, 50 Church St.  
ORLANDO, FLA.—Ward Engineering Co., Inc., 1217 West Central Ave.  
PHILADELPHIA 2—Joralemon, Craig & Co., 112 So. 16th St.  
PHOENIX—J. E. Redmond Supply Co., 625 W. Madison St., P. O. Drawer 869  
PITTSBURGH 22—Russell F. Clark Co., 1404 Clark Bldg.  
ROCHESTER 4, N. Y.—Rittenhouse & McGuire Co., 311 Alexander St.  
SAN FRANCISCO 5—Herman E. Held, 120 Main St.  
SEATTLE 4—Eicher & Co., 263 Colman Bldg.  
ST. LOUIS 1—C. B. Fall Co., Suite 1003, 317 N. 11th St.  
SYRACUSE 2—James E. Naylor-George O. Miller, 317 State Tower Bldg.  
TULSA 1, OKLA.—Riddle and Hubbell, 302 S. Cheyenne Ave., P. O. Box 727  
WASHINGTON 11, D. C.—Weston Electrical Instrument Corp., 6230 Third St., N. W.

### Canada

CALGARY, ALTA.—Northern Electric Co., Ltd., 102 11th Ave.  
HALIFAX, N. S.—Northern Electric Co., Ltd., 86 Hollis St.  
MONCTON, N. B.—Northern Electric Co., Ltd., 599 Main St.  
MONTREAL, QUE.—Northern Electric Co., Ltd., 1620 Notre Dame St. W.  
MONTREAL, QUE.—Powerlite Devices, Ltd., 807 Keefer Bldg.  
OTTAWA, ONT.—Northern Electric Co., Ltd., 141 Catherine St.  
REGINA, SASK.—Northern Electric Co., Ltd., 2300 Dawdney Ave.  
TORONTO, ONT.—Powerlite Devices, Ltd., 1870 Davenport Road  
TORONTO, ONT.—Northern Electric Co., Ltd., 131 Simcoe St.  
VANCOUVER, B. C.—Northern Electric Co., Ltd., 150 Robson St.  
WINNIPEG, MAN.—Northern Electric Co., Ltd., 65 Rorie St.

# Weston Electrical Instrument Corporation

601 FRELINGHUYSEN AVENUE, NEWARK, N. J.



# GENERAL ELECTRIC COMPANY

EDUCATIONAL SERVICE DIVISION

1 River Road, Schenectady 5, N. Y.

## SERVICES AND LABORATORY EQUIPMENT FOR EDUCATIONAL INSTITUTIONS



### What Are Educational Services?

Several hundred men of the General Electric Company work with educational institutions. From the beginning many facilities of the Company have been available to help raise the standards of education. This service may be providing up-to-date informa-

tion or assistance in the equipping of laboratories.

Some of these services are particularly for colleges, others for high schools, while still others can be used to good advantage by either.

These are offered in the following general areas:

*LABORATORY EQUIPMENT — SPEAKERS' PLANNING — VISUAL AID  
TECHNICAL ARTICLES — TECHNICAL HELP*

### Who Can Secure Services?

Although we make products in many fields and carry on investigations in others, our offerings are made chiefly in those where we can contribute most

effectively. These would generally be the departments of —

*ENGINEERING — SCIENCE — VOCATIONAL SCIENCE — HOME ECONOMICS*

### How You Can Secure Services

To improve our service we have appointed Company men throughout the country to be our representatives with certain schools. To obtain prompt replies, requests should be sent to them. If your school

has no such person, or you do not know who he is, you should write to our Specialist nearest you, our Educational Authority, whose name appears on the following list:

Location	Address	Authority
Atlanta 3, Georgia	187 Spring Street, N. W.	R. S. Griffith
Boston 1, Mass.	140 Federal Street	W. E. Haycock
Butte, Montana	103 No. Wyoming Street	W. H. Mott
Chicago 80, Illinois	840 South Canal Street	E. G. Abbott, H. D. Sanborn
Cleveland 4, Ohio	4966 Woodland Avenue	R. C. Hardy
Dallas 2, Texas	1801 North Lamar Street	R. T. Shiels
Denver 2, Colorado	650 Seventeenth Street	A. S. Anderson
Detroit 2, Mich.	700 Antoinette Street	C. M. Dunn
Los Angeles 54, Calif.	212 North Vignes Street	S. W. Scarfe
New York 22, New York	570 Lexington Avenue	F. A. Faron
Philadelphia 2, Pa.	1405 Locust Street	R. H. Rensch
Salt Lake City 9, Utah	200 So. Main Street	L. M. Stauffer
San Francisco 6, Calif.	235 Montgomery Street	R. O. Brosemer
Seattle 11, Washington	710 Second Avenue	L. B. Robinson

## College

**Laboratory Equipment.** Special educational equipment for engineering and science departments is developed based on the suggestions and advice of men familiar with the problems of the courses involved. Much of our standard equipment has been adapted for educational purposes. Electric rotating machinery and control, distribution and measuring equipment constitute a large part of this service. The fields of light, heat, sound, chemistry, electronics, and mechanics are a few of those for which we also provide equipment.

**Planning Help.** When new laboratory installations are to be made or old ones remodeled, we have experienced men who are qualified to give information concerning choice of equipment, arrangement of facilities, etc.

New textbooks are being written on subjects with which our men are familiar. We are prepared to supply technical information or counsel in these fields to the end of helping the author produce an up-to-date book. Illustrations which will add to the interest and content of such texts are available, and their use is encouraged.

**Charts.** Technical charts are printed to help with the understanding of basic principles, equipment

operation, or scientific development. These may apply to mechanical, electrical, chemical, or physics departments.

**Photographs.** Enlargements of pictures appearing in some of our periodicals are available to colleges. These may be used as illustrative material for lectures, for temporary displays, or for permanent illustrations.

**Publications.** Engineers with the Company are continually writing technical articles for publication in magazines or presentation at professional meetings.



These introduce up-to-the-minute developments in special fields. Reprints of these are made available to college professors to be used as supplements to texts. Bulletins on specific subjects are frequently published and can also be used to good advantage in the classroom.

Certain periodicals are sent regularly to college departments where up-to-date information in particular fields will be most valuable. This special mailing service is arranged with each professor to fill his individual needs.

"Educational Service News" is sent to college professors and libraries each month during the school year. It features recent developments at General Electric, descriptions of new equipment for schools, lists of technical articles appearing in various magazines, examples of practical engineering problems, photographs, and articles of interest to college professors and students.

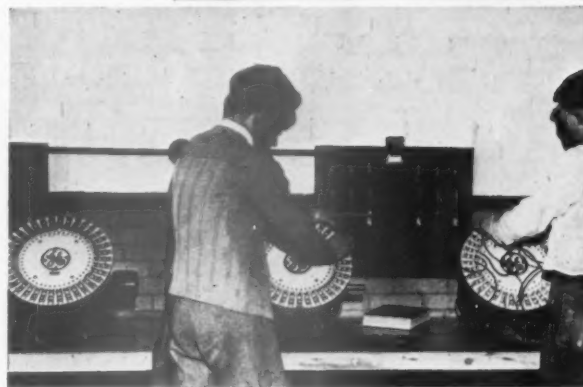
**Speakers.** Well-qualified representatives of the Company are often asked to speak on their special fields at professional or technical meetings. Many of these men also speak to college groups or at meetings when arrangements can be made conveniently.

## High School

Many materials available for high schools can be supplied only to teachers—such as charts and certain publications not printed in large quantity. Some booklets on the history of scientific developments, stories of research and engineering problems, educational comic books, and brief biographies of famous scientists, can be obtained in sufficient numbers for distribution to pupils.

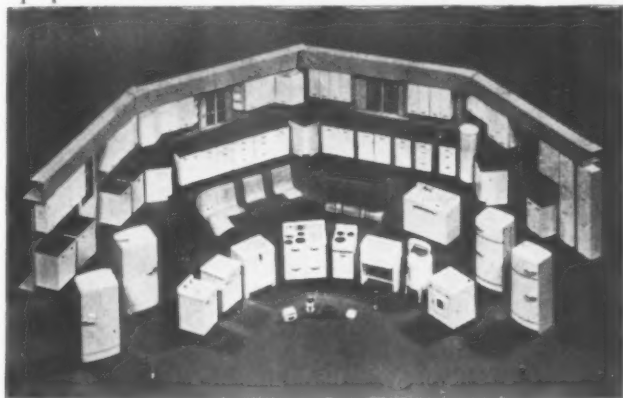


**Laboratory Equipment.** We are constantly working on new ideas for equipment which will have value to education. Many of our items, such as meters and instruments, are standard equipment for science laboratories. Motor-generator power supplies and accompanying switchboards are especially designed to meet the needs of laboratories and shops. Motor kits, making possible the construction of operable motors, are available for electrical courses. The illustration shows an example of a special educational unit.



## College and High School

**Home Economics.** The "Applianset," an all-electric kitchen in miniature, consists of 85 accurate plastic models, scaled one inch to the foot, of the types of equipment used in a home economics course. Items



such as cabinets, laundry appliances, kitchen appliances, walls, windows, doors, chairs, etc., make this set flexible enough to achieve many arrangements. These may be purchased for experimental planning by class groups where different ideas as to arrangement of facilities may be tried.

The General Electric Company has a plan whereby educational institutions may equip home-economics and home-management centers with appliances at special prices. This plan provides for replacement of appliances whenever changes warrant new models. Appliances are available under this plan only when used for instructional purposes within the school building. Printed material giving further details of the plan will be sent upon request to those interested.

**Motion Pictures and Slides.** We shall be glad to provide motion picture films, filmstrips, and slides as described in our catalog. Films are lent free of charge

to exhibitors in the United States, provided they will pay for transportation. The glass slides and filmstrips are accompanied by a script which may be read or used to prepare a lecture in conjunction with the slides. Titles such as "Jet Propulsion," "Exploring with X-rays," "Principles of Electricity," "Excursions in Science," and "The Magic of Fluorescence" show the type and variety of the pictures which may be secured.



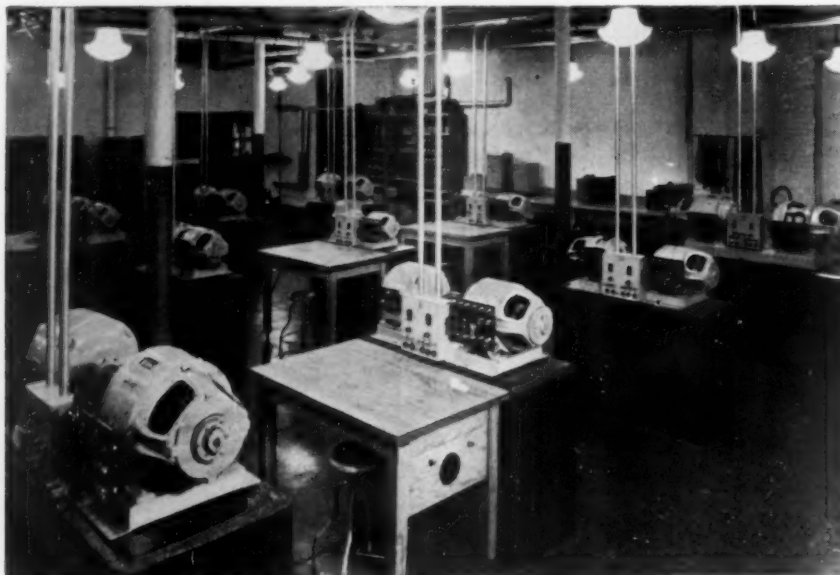
**Photo News Service.** Twice a month these 14- by 17-inch posters bring illustrations of recent events to the laboratory, classroom, and library. Many phases of engineering, science, and manufacturing are dealt with. Captions add to the reader's knowledge of current developments in the electrical industry. Subjects include such fields as power apparatus, lighting, electronics, plastics, air conditioning, weather research and nucleonics and aeronautics.

**News Digest.** This much-quoted periodical, issued bi-monthly, interprets the latest in General Electric developments in science and engineering for the adult reader. Using two-color cartoons and diagrams and stressing underlying principles and their applications, the "News Digest" is of particular appeal to science instructors of high school and college level.





## EDUCATIONAL LABORATORY EQUIPMENT



Partial view of electrical laboratory,  
State University of New York, Technical Institute, Binghamton

### Rotating Machines

General Electric can furnish more than forty combinations of rotating machines for the main power laboratory. Each set is equipped with educational terminal boards and quick-disconnect couplings.

#### Direct-current

- 2-wire and 3-wire machines
- Balancer sets
- Shunt, compound, and overcompounded designs
- Armature exploring-coil units.

#### Polyphase

- Squirrel-cage and wound-rotor units
- Multispeed and adjustable-speed induction motors
- Synchronous alternators and motors, including provision for phase-displacement studies
- Special 72-terminal winding-study motor.

#### Single-phase

- Capacitor-motors, repulsion-induction and adjustable-varying-speed motors.

#### Cradled Dynamometers

- Both d-c and a-c synchronous types, 6 to 7½ hp motoring, 10 hp absorption.

All these rotating machines are available as individual units, or in 2- and 3-unit motor-generator sets.

New small cradled d-c  
dynamometer



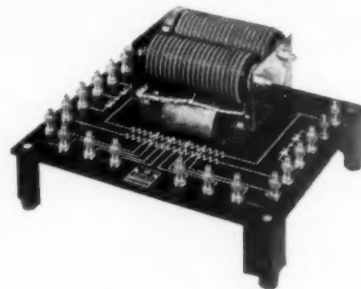
### New Low-cost Cradled D-c Dynamometer

- |                          |                 |
|--------------------------|-----------------|
| ¾ hp motoring            | 1 hp absorption |
| Speed: normal — 1725 rpm |                 |
| maximum — 4000 rpm       |                 |

Complete with scale, instrument panel, and load resistors. Tachometer equipment optional.

### Educational Amplistat

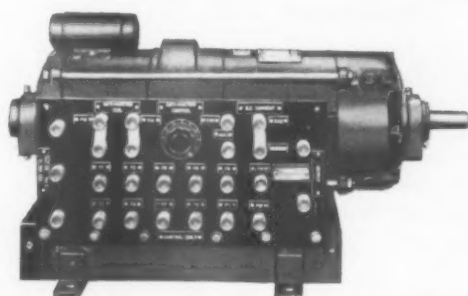
Students can perform new and timely experiments in magnetic amplification with the G-E educational amplistat. This unit demonstrates the principles of the self-saturating, polarity-conscious magnetic amplifier. It has four control windings especially suited to a variety of experiments. The reactor, rectifiers, and control windings are wired individually to spring terminals; students must make all connections, but this can be done easily and quickly.



Educational amplistat

### 1500-watt Amplidyne Control and Servomechanism Kit

The amplidyne generator has seven control fields connected to educational spring terminals. Auxiliary components included with the kit, such as selsyns, electronic tubes, transformers, and a small gear-motor, permit experiments with voltage-regulator or current-regulator applications, and with amplidyne follow-up systems.



Amplidyne generator for educational use

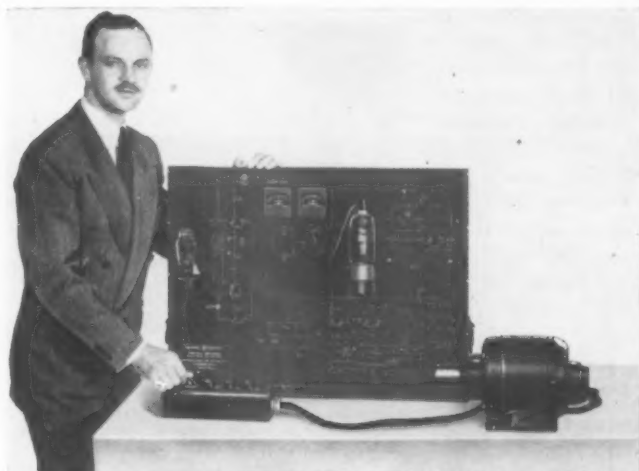
### Educational \* Thy-mo-trol Kit

Functionally, this equipment is the same as the half-wave Thy-mo-trol adjustable-speed drive used by industry. However, this educational unit has many features designed especially to assist in teaching the fundamentals of the circuits of half-wave electronic motor control.

All circuit diagrams and component symbols are molded in white into the front of the dark \*Textolite panel.

All components are readily accessible, and are mounted directly back of their symbols on the front of the panel.

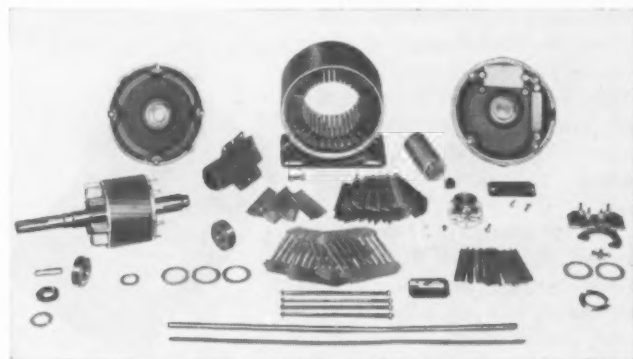
Panel-mounted instruments facilitate group demonstrations and discussions.



Thy-mo-trol kit in classroom use

### Motor Construction Kits

With these construction kits, students can gain valuable experience in building standard motors of the highest commercial quality and design from production-line parts. Everything is included, except the wire and insulating varnish, which are readily available locally. Students wind the coils and assemble all components. No machine work is required.



Motor construction kit

\* Reg. Trade-mark of General Electric Company.

### Adjustable Capacitors

Adjustable capacitors are helpful in conjunction with loading resistors and variable reactors, for simulating loading conditions on a-c generators, and for other test work.

Rating:  $\frac{1}{2}$  to  $31\frac{1}{2}$  microfarads at either 550 volts, d-c, or 250 volts, 60 cycles, a-c, single-phase; adjustable in six steps by means of toggle switches on the top of the case.



Adjustable capacitor

### Variable Reactors

Variable reactors for loading a-c generators and for other test work are available in both single-phase and 3-phase ratings, in a range of approximately 5 to 35 amperes.



Variable reactor

### Adjustable Resistors

Single-phase and d-c loading resistors are available in ratings from  $2\frac{1}{2}$  to 10 kw. Three-phase units range from  $2\frac{1}{2}$  to 20 kw. All units have six knife switches which provide six equal steps of resistance from 0 to 100 per cent of the rating. All units are available either with or without rubber-tired-caster mountings.



A three-phase loading resistor

### Portable Harmonic Generator

Designed to demonstrate wave shapes and properties of electric circuits, the portable harmonic generator produces harmonic voltages and feeds the output into an oscilloscope. The outputs obtained are the fundamental voltages and five harmonic voltages

having frequencies 2, 3, 4, 5, and 7 times the fundamental voltage. Amplitude and phase angle are independently adjustable for each element.



Portable harmonic generator

### Switchgear

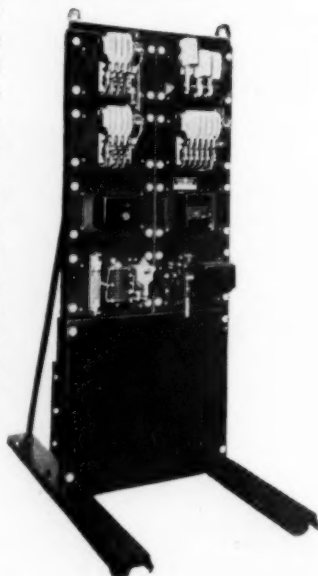
Laboratory switchgear equipment is available for the main power laboratory, the electronics laboratory, and the physics laboratory. Each unit meets all the functional requirements of good switchgear with respect to power distribution, control, and instrumentation. Any combination of panels can be used as a unit. The smaller laboratory can purchase partial equipment at a time and add other panels later.



Typical laboratory switchgear unit

### Laboratory Control Panels

These a-c and d-c laboratory control panels facilitate the study of the magnetic-control combinations most common to modern practice in the starting, accelerating, and protection of motors. All connections for each individual control device are brought out to separate educational spring terminals behind the panel. Students are required to select functional devices and inter-connect them to comply with a laboratory specification for a particular control assembly.

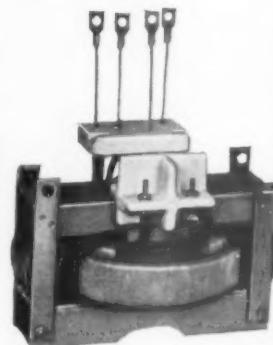


Laboratory control panel

### Transformer with Scott Taps

The basic unit is a 3-kva modern distribution transformer, primary 240 volts, secondary 120/240 volts, with Scott taps in both primary and secondary windings.

The core-and-coil assembly of this transformer, without case and oil, is illustrated. This unit can be operated at 1½ kva. Other laboratory transformer equipments are also available.



Transformer core-and-coil assembly

### Spring Terminals

Educational spring terminals conserve students' time in making connections to all types of electric equipment. The illustration shows how easily connections can be made to a device equipped with these terminals. A spring around the center post of the terminal is compressed when the knurled knob is pulled forward; when the knob is released, the spring causes the terminal lead to be clamped between the lower collar and the knurled knob. Instrument leads can be clamped to the terminal.

Available in 20-, 40-, and 50-ampere sizes.

Connections are easily made with educational spring terminals



### Instruments for Every Educational Requirement

Type AP-9 (a-c) and DP-9 (d-c)  
Accuracy  $\frac{3}{4}$  of 1 per cent and  $\frac{1}{2}$  of 1 per cent full scale  
Scale 4.1 inches with mirror arc

These sturdy, compact, medium-size, portable instruments are ideal for field testing and general laboratory use. The reliable movements are well-damped, effectively shielded, and housed in dust-tight molded cases. Separate binding posts for each range reduce the danger of overloading. They are available in single, double, and triple ranges of voltmeters, ammeters, volt-ammeters, volt-wattmeters, and single-phase wattmeters.

A wide assortment of instruments is also available for all other purposes—ranging from precision instruments with an accuracy of  $\frac{1}{2}$  of 1 per cent full scale to small panel instruments with 2 per cent accuracy.



Typical medium-size portable instrument



# EFFECTIVE TEACHING PACES MODERN INDUSTRY

## with G-E Electronics Course

A slidefilm course, with sound, in Industrial Electronics produced by the leading manufacturer of Industrial Electronics equipment! Excellent for fundamental instruction or review for advanced physics, electrical and other technical students anxious to take their places in the growing world of Industrial Electronics. Visual aids were found to teach 35% faster, provide 35% longer retention by the United States Armed Forces.

Scores of schools, colleges, businesses, industries, unions, and utility companies have purchased and used these kits in their training programs. Every sequence of this 12-part course has been put to test on groups of widely different education levels. Educators have joined plant executives in praising its combination of easy understanding and technical accuracy.

This kit is a powerful teaching aid. Among the hundreds of purchasers are:

19 colleges and junior colleges including, Illinois Institute of Technology, Cornell, University of California, Purdue, West Point, University of Wisconsin, and others.

14 city school systems including Los Angeles, Detroit, Philadelphia, Syracuse, Minneapolis, San Francisco, Spokane, and others.

20 leading trade and vocational schools all over the country.

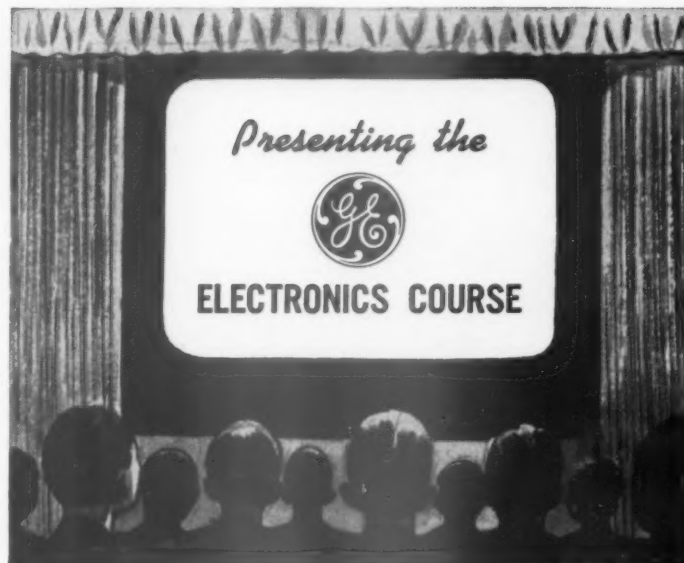
11 government and military groups.

Over 200 industrial concerns.

The arduous but essential task of teaching fundamentals become easy with the help of these individual films and lesson books on the 12 following subjects:

- |   |  |
|---|--|
| 1. Harnessing the Electron              | 7. Electronic Rectifier Equipment        |
| 2. Electronic Tubes as Rectifiers       | 8. Thy-mo-trol (Thyratron Motor Control) |
| 3. Grid Control of Electronic Tubes     | 9. Electronic Control of A-c Power       |
| 4. Fundamentals of Electricity, Part I  | 10. Electronic Frequency Changing        |
| 5. Fundamentals of Electricity, Part II | 11. Photoelectric Systems                |
| 6. Electronic Relay Systems             | 12. Electronics, Today and Tomorrow      |

See page 841 for data on G-E floodlighting equipment, and page 594 for information on fluorescent lighting ballasts.



### *Here's what you get*

**12 SLIDEFILMS AND RECORDED TALKS**—each about 1/2 hour long.

**120 REVIEW BOOKLETS**—10 sets of 12 individual lessons, keyed to slidefilms.

**1 INSTRUCTOR'S MANUAL**—a 140-page book with hundreds of illustrations and detailed steps for conducting the course.

**1 CARRYING CASE**—attractive and strongly built, it holds records, films, and manuals.

**THE PRICE**—for the complete "package" as above, \$150; extra manuals, \$3; extra sets of 12 review booklets, \$3.

**FREE TRIAL OFFER**—Because we are anxious for you to inspect this kit, we will loan one to you, free of charge, for a 10-day period.

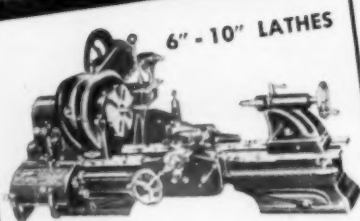
**ORDERS**—can be placed through any local G-E office, or write directly to Apparatus Department Section 640-257, General Electric Company, Schenectady 5, New York. For additional information write for Bulletin GEA-5339.

All you need is a sound slidefilm projector (35 mm, 33 1/3 rpm) and a screen.

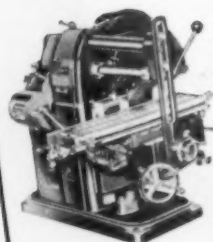
# ATLAS PRESS COMPANY

1950 N. Pitcher Street • Kalamazoo, Michigan

## METALWORKING



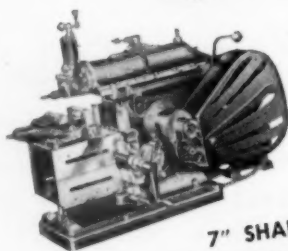
6" - 10" LATHES



MILLING MACHINES



BENCH AND FLOOR DRILL PRESSES



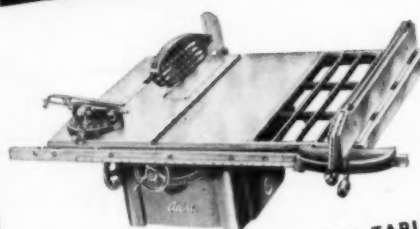
7" SHAPER

# Atlas

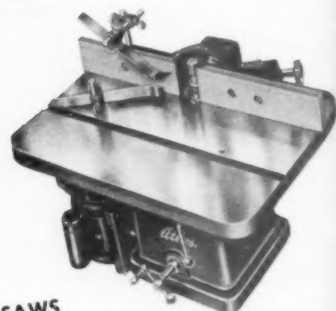
There are many ways Atlas tools can be helpful when you plan for equipment expansion or replacement. If shop space is limited, compact Atlas tools give you more pupil stations in the available space. Atlas quality construction will win commendation from those who expect you to buy tools for many years of good service.

Best of all, Atlas low prices enable you to buy *more tools* for your equipment dollars so that *more students* have opportunity to get sound operational experience. Send a postcard today for the latest Atlas catalogs as a guide in determining your recommendations and requisitions.

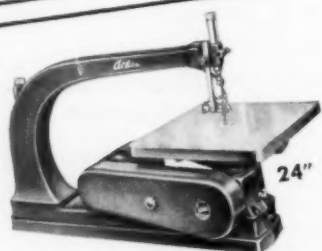
## WOODWORKING



8" AND 10" TABLE SAWS



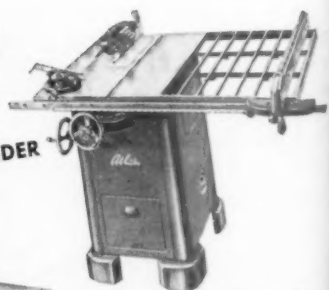
WOOD SHAPER



24" JIG SAW



BELT AND DISC SANDER



10" FLOOR SAW



12" WOOD LATHE



6" JOINTER PLANER

**FREE**

INSTRUCTIONAL WALL CHARTS  
and LATEST CATALOGS—Write.

ALL ATLAS TOOLS ARE MADE TO FULL INDUSTRIAL STANDARDS FOR PRECISION AND LONG SERVICE. SPECIAL OPERATING GUARDS HAVE BEEN DEVELOPED FOR SAFE USE IN THE SCHOOL SHOP. ASK YOUR ATLAS DISTRIBUTOR TO SHOW YOU ALL THE NEW FEATURES.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# HARPER ELECTRIC FURNACE CORP.

1440 Buffalo Avenue

Niagara Falls, N. Y.

REPRESENTATIVES IN PRINCIPAL CITIES  
Incorporated 1924

## HIGH TEMPERATURE *Electric* KILNS AND FURNACES

for  
**Ceramic Training**



Model SK-202421-SF Studio Kiln



Harper Electric Kilns for ceramic training and Laboratory Furnaces for general shop training are available in many sizes to meet the requirements of educational institutions and in three temperature ranges, 0-2120°F, 0-2500°F, and 0-2750°F.

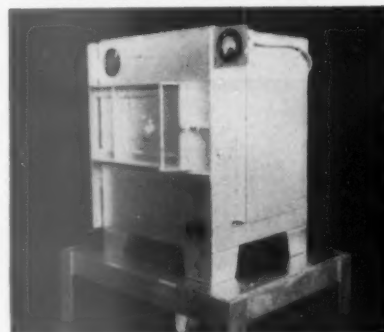
They provide instructors with sturdy, dependable classroom equipment that can be operated with confidence.

Years of satisfactory service at the leading schools and universities prove that Harper Kilns and Furnaces are ideal equipment for the advancement of ceramic and general shop education. Write for complete literature.

for  
**General Shop Training**



Laboratory Furnace Model HL-5



### Universities

The 6 cu. ft. Kiln pictured above is popular in University Ceramic Departments and will accommodate large classes of students. It is designed to properly fire the complete range of Ceramic Ware, including low temperature overglaze decorations, art pottery as well as high temperature china, stoneware and porcelain.



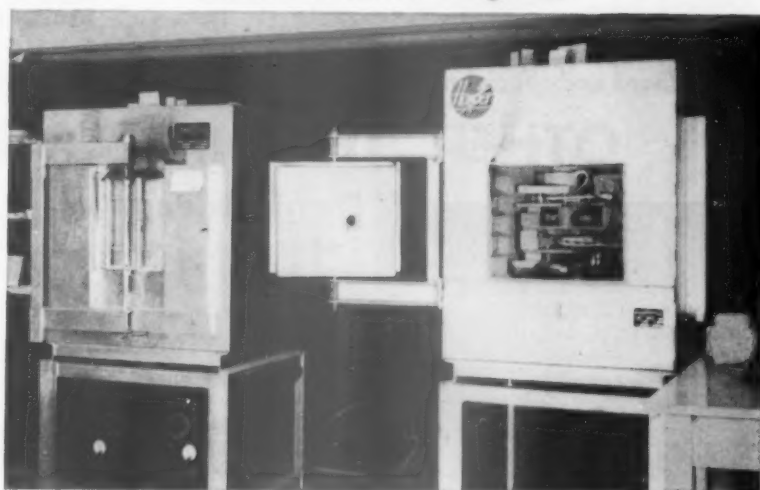
### High Schools and Vocational Schools

A popular classroom kiln, is Model SK-151416 pictured above at Buffalo State Teachers College. 1½ cu. ft. of useful firing space easily accommodates 35-40 students. Instructor E. H. Strong, at right, says: "The flexibility of control provides proper firing and cooling cycles, and the capacity to operate safely and efficiently in any temperature range makes it ideal for Ceramic Training in the Industrial Arts field."

### Elementary Schools

Harper Kilns such as Model SK-999 at right make ideal equipment for Grade Schools. They are safe and easy to operate. Ware can be fired slowly, thus eliminating breakage caused by loosely constructed ware made by the smaller children.

### Adult Education Programs



Harper Kilns are excellent equipment where several instructors handle the kiln. Sturdily constructed, they do not require constant maintenance. Photo shows two Harper Kilns at the Whitney Adult Arts and Craft Center, Niagara Falls, N. Y. The two kilns operate alternately from one transformer, thus saving equipment cost.



# PERENY EQUIPMENT COMPANY

Dept. W., 893 Chambers Road, Columbus 12, Ohio  
EXPORT DEPT.—The Inland Export Co., Inc., Greer Bldg., New Castle, Pa.



## PERECO KILNS AND FURNACES

Here are a few typical items in the complete line of  
PERECO EQUIPMENT for many of your school needs

*Easy to use, compact, durable, and priced amazingly low!*



### FULLY SELF-CONTAINED MODELS

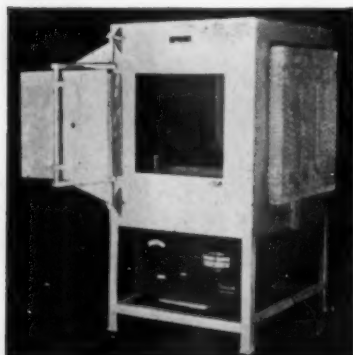
including instruments for accurate control

**"CB SERIES"**—Students in ceramics and metals develop special skills more readily from practical experience with Pereco industrial-type equipment. An ideal training unit, the electrically operated CB-55 (left) is one of a series of tool hardening, brazing, sintering and general shop furnaces.

**"LB SERIES"**—One of a group of ceramic kilns, the LB-74 (right) with built-in controls and instruments, saves space in crowded labs or classrooms. Global non-metallic elements quickly and evenly heat the thickly insulated working chamber, reaching 2700° F. for continuous use and up to 3000° F. for short runs.

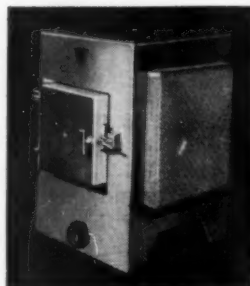


### PERECO OFFERS A WIDE CHOICE OF TYPES AND SIZES



#### Some for high temperatures

Pereco Electric Kilns and Furnaces cover a wide range of heat applications, firing schedules, and work capacities. This simplifies selection of the most practical equipment for instructional use. The SM-7800 at left, for example, is a stock unit that provides easily regulated temperatures up to 2700° F. There are many more.



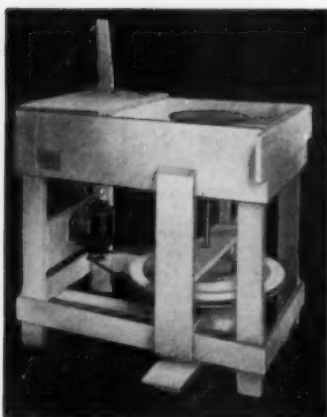
#### Others for low...

A variety of efficient, bench-type, electric units in the Pereco line have ample capacity for classroom projects requiring relatively low temperatures. All are handily portable, simple to operate, safe and clean. We invite your inquiries.

• NEW LINE OF PERECO GAS UNITS ALSO AVAILABLE

*Standard and special models for any temperature from 450° to 5000° F.*

## OTHER TEACHING AIDS



### Electric Melting Pots— for lead, tin, and other nonferrous metals

This equipment is complete and ready to use for melting type metals in print shops, for lead or tin dipping, etc. Automatic temperature controller keeps heat constant at desired levels. Model L-818 shown here has capacity for 400 lbs. of tin. Another smaller Model L-810 holds 250 lbs. of tin. Both of these reach a maximum temperature of 900° F.

### Potters Wheels— motorized or kick type

Pereco Patented Variable Speed Wheels, with self-aligning ball-bearing mount and foot-controlled stepless friction clutch, assure smoothly regulated, mechanical turn of clay in work. Kick Wheel is similar to motor-driven unit shown here. Either wood or all-steel frames.

• Ball Mills • Whirlers • Ceramic Hand Tools



WRITE FOR  
DETAILS  
TODAY



# STANDARD PRESSED STEEL CO.

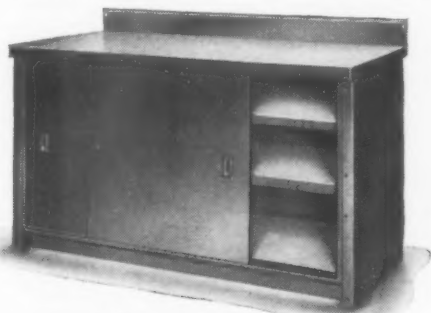
OVER 46 YEARS IN BUSINESS

Jenkintown 45, Penna.

BRANCHES: CHICAGO • DETROIT • ST. LOUIS • SAN FRANCISCO

## HALLOWELL SHOP EQUIPMENT OF STEEL

Standardized, *ready-made* HALLOWELL Work Benches . . . interchangeable units readily adaptable to individual requirement. Easily bolted together to form continuous bench, yet may be taken apart and reassembled as single units. Rigid, heavy-duty construction eliminates bolting to the floor, minimizes installation and maintenance.



**HALLOWELL Cabinet Benches** . . . models with steel tops widely used as "paint and stain" or "glue" benches. Fully enclosed bases with close-fitting sliding doors for safe storage of paint, shellac and other flammable materials. Doors fitted with cylinder lock. Wood top models ideal for machine shop work.



**HALLOWELL Model 600 Standard Benches** . . . with wood tops (1 3/4", 2 1/4" or 2 5/8"). Used in many cases as "vise benches," . . . also as general shop benches. All-steel storage cabinets available for mounting beneath bench top. Models also available with steel tops.



**HALLOWELL Model 606 Standard Benches** . . . with steel top, backboard, end pieces and lower shelf. Frequently specified as a "soldering bench" but equally adaptable to a wide variety of machine shop uses. This "complete" bench also available with wood or Presdwood-covered steel tops. HALLOWELL standardized bench units and accessories include four standard style variations, three top materials, four stock length units, three widths and three heights.

Full information on Work Benches contained in Bulletin 701. Also, detailed literature on all other items of popular HALLOWELL Shop Equipment.



**STEEL STOOL**

Strong, welded construction. Heights from 18" to 30" . . . also, adjustable models.



**LABORATORY OR DRAFTSMAN'S STOOL**

Heights from 17" to 27" . . . 4" screw adjustment. With or without footrest.



**CARRY-TOOL**

The handier tool stand. Also, fully enclosed portable tool cabinets.

## HALLOWELL

Work Benches  
Tool Stands  
Foreman's Desks  
Platform Trucks  
Posture Stools  
Posture Chairs  
Cabinets  
Folding Tables

# AMERICAN TYPE FOUNDERS

*Department of Education*

200 Elmora Avenue, Elizabeth B, New Jersey

## From Preliminary Planning to Equipment Installation for GRAPHIC ARTS DEPARTMENTS

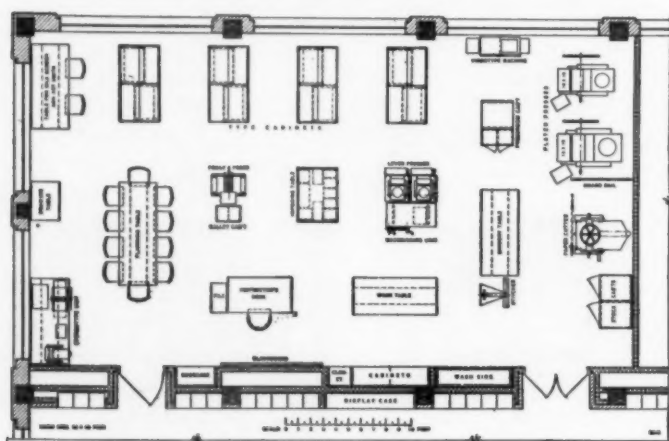
In devising a floor plan, whether for a junior, senior, or vocational high school, consider these fundamental factors:

First, routing material. Definite functional relationships between all items of print shop equipment determine their correct locations and make for efficiency in class organization and operation. Proper layout eliminates unnecessary travel and confusion and promotes discipline.

Second, natural lighting. Equipment should be so located that light from windows enters at the side of each pupil. Operators should not face the light nor work in their own shadows.

Third, safety. All machinery should be completely equipped with safety devices and should be so placed that the operator is not standing in a thoroughfare aisle. If the room is on the first floor, the lower half of the windows should be translucent glass to reduce outside distractions.

In all layouts prepared by ATF, correct location of equipment provides maximum operating efficiency, correct lighting and pupil safety. The ATF Department of Education has assisted School Architects and Administrators for over 30 years in planning Graphic Arts Departments. This specialized engineering service is available without obligation to school officials and architects preparing new school building plans.



A typical ATF-planned graphic arts department is well equipped, efficiently arranged, properly lighted.



### These Complete Layouts Are Available to School Architects and Administrators

The following ideal room layouts complete with item specifications are available on request. Other special room layouts will be prepared when local conditions do not permit the use of these standard plans.

#### Junior High

6-J	6 to 10 students	528 sq. ft.
12-J	12 to 15 students	840 sq. ft.
15-J	15 to 19 students	960 sq. ft.
20-J	20 to 24 students	1080 sq. ft.

#### Senior High

6-S	6 to 10 students	598 sq. ft.
11-S	11 to 15 students	910 sq. ft.
15-S	15 to 20 students	1040 sq. ft.
20-S	20 to 25 students	1248 sq. ft.

#### Vocational

10-V	Letterpress Printing Unit, 10 to 20 students	2240 sq. ft.
20-V	Letterpress Printing Unit, 20 to 25 students	2968 sq. ft.
10-SO	Standard Offset Printing Unit, 10 to 13 students	1012 sq. ft.

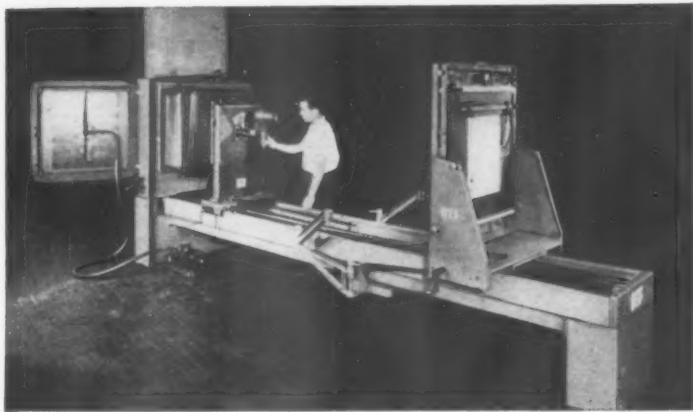
#### Teachers College

20-TC	20 to 24 students	1430 sq. ft.
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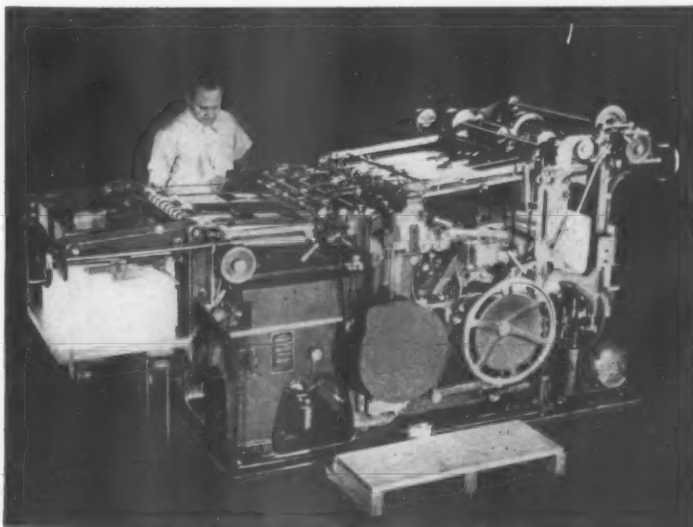


## ATF Provides Complete Equipment for Graphic Arts Departments

*Manufacturers of Kelly Presses, Little Giant Presses, Chief Offset Presses, Web-fed Offset Presses, Gravure Presses, Foundry Type and Process Cameras. Distributors of Mann Offset Presses, Vandercook, Challenge, Chandler & Price, Hamilton and Rosback Equipment for Composing Room, Pressroom and Bindery.*



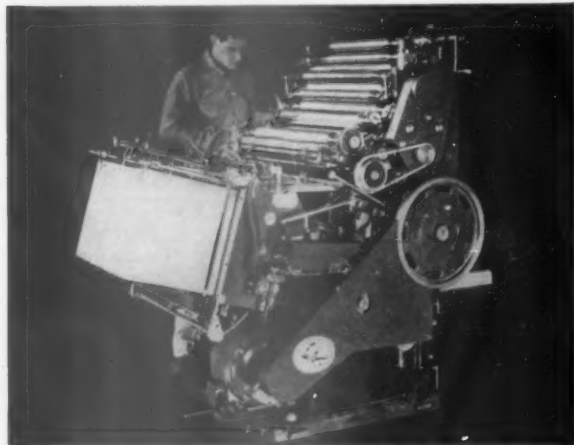
ATF process cameras are made in three sizes: 14" x 17", 24" x 24", 32" x 32". Modern in every detail, their simple design and rigid construction promote efficient learning of photographic fundamentals.



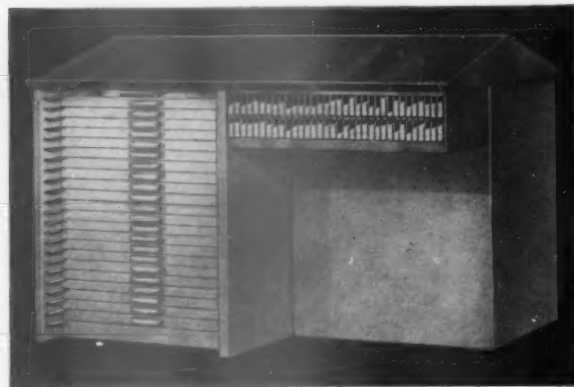
Books, broadsides and school newspapers are well within the range of the famous C-Kelly. It takes an economical 17½" x 22½" sheet, includes many modern safety features, turns out fine halftone and color work.



Students will learn the fundamentals of letterpress printing on the new Model 6 Little Giant. This versatile 12" x 18" press needs little floor space, gives 2500 to 5000 impressions per hour, handles any stock from tissue to 4-ply cardboard.



Both the fundamentals and fine points of offset printing are readily learned when students operate an ATF Chief 22 Offset Press. Simple design, easy accessibility, every required facility for rapid, high-quality production.



Ruggedly built Hamilton cabinets for all school needs, withstand years of severe student use. Steel construction of approved design.

# BROWN & SHARPE MFG. CO.

Providence 1, R. I.

Established in 1833

## Complete Your Students' Education

... instruct them with tools that meet the machinist's exacting requirements

For nearly a century, Brown & Sharpe tools have been the pride of skilled machinists. They have given the fullest measure of accuracy, reliability, sound design and lasting construction.

The Brown & Sharpe line covers almost every machinist's requirement for precision tools . . . from micrometer calipers to the latest type of electronic measuring equipment. Brown & Sharpe Mfg. Co., Providence, 1, R. I., U. S. A.



**ELECTRONIC MEASURING EQUIPMENT** for gaging by .0001" to .00001". Amplifier illustrated. Attachments for internal and external gaging and gaging in jigs and fixtures. Also signal light attachment.



**JOHANSSON GAGE BLOCKS and ACCESSORIES**



**No. 616 CYLINDRICAL GRINDING and INDEXING ATTACHMENT** for surface grinding machines.

**MACHINISTS' TOOLS**



**VICES**



**ARBORS, ADAPTERS and COLLETS**

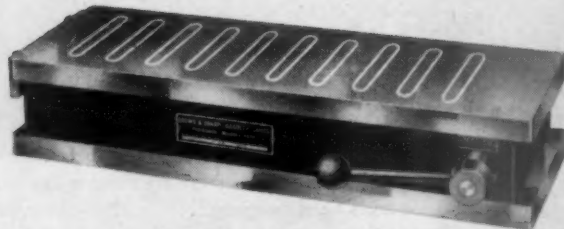


**PUMPS**

**SCREW MACHINE TOOLS**



**MILLING CUTTERS**



**PERMANENT MAGNET CHUCKS**

# GREENLEE TOOL CO.

DIVISION OF GREENLEE BROS. & CO.

1716 Columbia Avenue, Rockford, Ill.

**CRAFTSMANSHIP COMES EASIER  
WITH GREENLEE WOODWORKING TOOLS**



NEW FREE FOLDER S-122 showing complete line of GREENLEE tools for the woodworker. Write for your copy today. Greenlee Tool Co., Division of Greenlee Bros. & Co., 1716 Columbia Ave., Rockford, Illinois, U. S. A.

*The teaching of precision workmanship is so much easier when your woodworking shops are equipped with the finest of tools. Students learn faster, are more interested, get the feel of true craftsmanship. That's why it pays to look to GREENLEE for hand tools and machine bits of highest quality as shown here.*

## ● CHISELS, GOUGES, TURNING TOOLS

Chisels for all types of work—carpentry, cabinet making, framing. Line includes socket butt and firmer styles. Blades are of special-analysis, high-grade crucible steel for long-lasting, fine-cutting edges. Highly-polished finish, perfect balance, hand-fitting handles. Also complete selection of high-quality gouges and turning tools.

## ● AUGER BITS, DRILLS, COUNTER SINKS

Auger bits for every need . . . all types of twists and heads. Cutting parts accurately sized to indicated diameter . . . twist ground for sure clearance . . . correctly shaped and proportioned spurs. Sharp cutting edges and each tool tested in wood. Also brace drills and countersinks.

## ● EXPANSIVE BITS

Fast, easy-boring . . . with free, positive chip clearance! Specially-designed wide, open throat assures smooth, uninterrupted action. All parts expertly designed and processed of top-quality steel. Made in two styles . . . Set-fast as illustrated or Plain.

## ● AUTOMATIC PUSH DRILLS

Built for long-time, accurate, smooth performance. Completely enclosed working parts stay dirt and grit free! The special phosphor bronze drive nut easily withstands constant, heavy usage. Handle houses the 8 drill points regularly supplied. Heavy chromium plating protects all exposed metal parts.

## ● SPIRAL SCREW DRIVERS

Sturdily constructed of highest quality materials for long, hard service. Special phosphor bronze drive nuts reduce friction to a minimum. Quick-action shift button provides easy, positive adjustments. Finished in polished chromium with hardwood handle.

## ● MORTISING AND BORING TOOLS

Renowned for their long life, GREENLEE tools for woodworking machines are made of the finest materials and are accurately ground. Line includes Hollow Chisels, Machine Bits, Drills, Multi-Spur Bits, and other tools.





# THE LUFKIN RULE CO.

Saginaw, Michigan, U. S. A.

NEW YORK: 106-110 Lafayette Street

## LUFKIN

### PRECISION TOOLS:

Chrome Clad Micrometers,  
Outside, Inside, Depth  
Squares, Combination, etc.  
Calipers  
Dividers  
Steel Scales  
Indicators  
Protractors  
Bevels  
Pin Vises  
V Blocks  
Clamps  
Hold Downs  
Scribers  
Rules, Steel  
Punches, Center & Drive Pin  
Tool Sets, Students

### Gages:

Center  
Depth  
Drill Grinding  
Feeler  
Planer  
Radius  
Screw Pitch  
Shaper  
Small Hole  
Surface  
Telescoping  
Thickness

### MEASURING TAPES:

Chrome Clad Steel  
Nubian Finish Steel  
Stainless Steel  
Engineers Steel  
Surveyors Chain  
Metallic and Other Woven  
Types  
Pockets, Steel & Woven

### STEEL TAPE-RULES:

Chrome-Clad  
Flexible—Rigid

### RULES:

"Red End" and Other Spring  
Joint  
Aluminum Folding  
Boxwood & Caliper  
Steel and Brass

### MANUAL TRAINING RULES:

34 V Maple  
60 and 62 Steel

**Firm Joint Caliper**

**One Inch Micrometer Calipers**

**Toolmakers Outside Caliper**

**Spring Divider**

**Micrometer Depth Gage**

**Inside Micrometer Caliper Set**

**Master Planer and Shaper Gage**

**Telescoping Gage**

**Test Indicator**

**Radius Gage Set**

**Inside Micrometer Calipers**

**Combination Set**

**Tempered Steel Rule**

**Manual Training Steel Rule**

**Chrome Clad Steel Tape**

**"Mesural" Tape-Rule**

**SEND FOR GENERAL CATALOG**

# MILLERS FALLS COMPANY

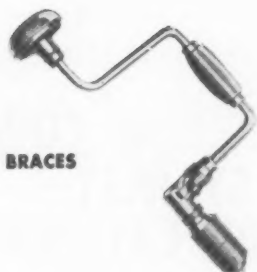
Greenfield, Mass.

## Outstanding Tools for Woodworking, Machine Shop, Building, Repair and Maintenance

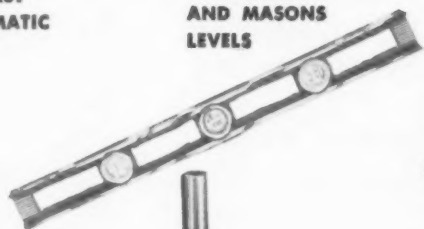
For years Millers Falls tools have been the first choice of many American Schools and Universities. Today they offer you the finest line in 82 years of toolmaking — hand tools with superb, modern styling and many unique features . . . electric tools packed with power and efficiency . . . cost-cutting hack saw blades for every purpose . . . time-tested machinists and precision tools of guaranteed accuracy. For value and performance, craftsmen the world over know it's hard to beat Millers Falls modern, rugged, hard-working tools.



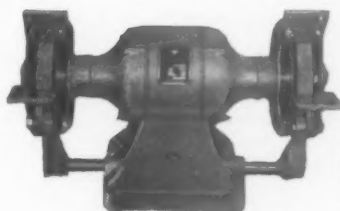
**WORLD FAMOUS  
PLANES AND BIT BRACES**



**HAND, BREAST  
AND AUTOMATIC  
DRILLS**



**CARPENTERS'  
AND MASONS  
LEVELS**



**BENCH GRINDERS**



**HACKSAW  
FRAMES**

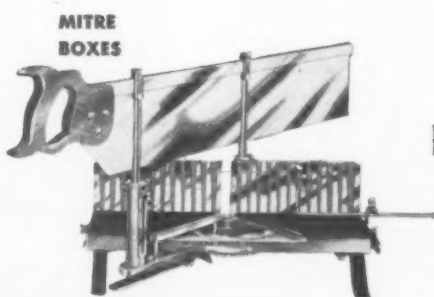
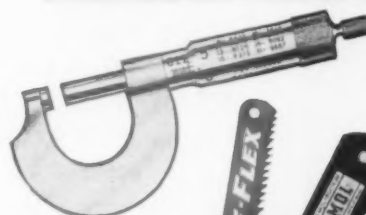


**SCREWDRIVERS  
ALL TYPES**



**PORTABLE  
ELECTRIC DRILLS,  
SCREWDRIVERS,  
HAMMERS,  
GRINDERS, SANDERS**

**MICROMETERS AND PRECISION TOOLS**



**MITRE  
BOXES**



**COMBINATION  
SQUARES**



**HAND  
AND POWER  
HACKSAW BLADES**



## NEW FREE CATALOG

Write today for your copy of Millers Falls new 172-page Catalog No. 49 illustrating and describing Millers Falls complete, modern line of fine tools.



# STANLEY TOOLS

EDUCATIONAL DEPARTMENT  
New Britain, Conn.

*Write Today*



## FOR YOUR COPY STANLEY TOOL CATALOG

Now Includes  
"YANKEE" TOOLS  
RUSSELL JENNINGS BITS  
(Divisions of Stanley Tools)

### . . . Tools for every school shop

**FOR WOODWORKING AND FARM SHOPS**  
The most complete line offered  
by one manufacturer.

**FOR ELECTRICAL SHOPS**  
Hammers, bit braces, bit exten-  
sions, screw drivers, etc.

**FOR SHEET METAL SHOPS**  
Hammers, chisels, punches, etc.

**FOR AUTOMOBILE SHOPS**  
Hammers, chisels, punches, screw  
drivers, etc.

**FOR MACHINE SHOPS**  
Hammers, rules, chisels, punches,  
levels, etc.

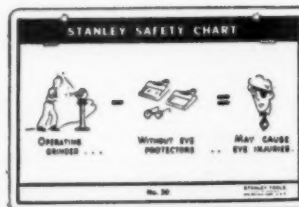
**FOR FORCE SHOPS**  
Anvil tools, tongs, hammers, etc.

**SOLD THROUGH ALL LEADING HARDWARE  
DISTRIBUTORS EVERYWHERE**

### SET OF 36 SAFETY CHARTS offered to Schools direct at cost

• Bold, pictorial "cause and effect"  
safety posters, printed in color on  
heavy cardboard, lacquered and eye-  
letted for hanging on wall. Yours for  
cost of printing and postage. . . .  
\$2.50 per set, postpaid, anywhere in  
U. S. A.

Other visual teaching aids and com-  
prehensive project plans available at  
cost. Write for literature.



STANLEY TOOLS Educational Dept., New Britain, Conn.

THE TOOL BOX

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OF THE WORLD

Reg. U.S. Pat. Off.

HARDWARE · HAND TOOLS · ELECTRIC TOOLS



# THE L. S. STARRETT COMPANY

*World's Greatest Toolmakers*

Athol, Massachusetts, U. S. A.

NEW YORK  
53 Park Place

Standard of

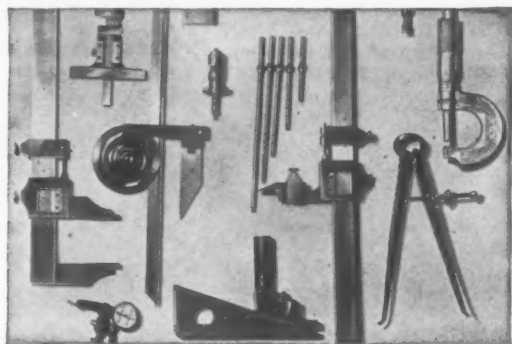


Precision

CHICAGO  
17 N. Jefferson Street

## MECHANIC'S HAND MEASURING TOOLS AND PRECISION INSTRUMENTS • DIAL INDICATORS • STEEL TAPES • HACKSAWS, BAND SAWS AND BAND KNIVES

Your tool dealer can show you a complete line of Starrett Tools for school shop use priced to fit your budget. For complete information, write for Starrett Catalog 26 SU.

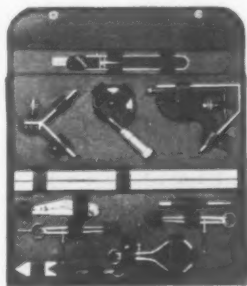


### STARRETT PRECISION MEASURING TOOLS

The fine workmanship and lasting accuracy that have made Starrett Tools the choice of skilled machinists have also made them standard school shop equipment. The complete STARRETT line includes a wide selection of Micrometers, Verniers, Calipers, Gages, Protractors, Squares and other mechanics' hand measuring tools and Precision Instruments.

### STARRETT No. 902 SET OF TOOLS

The essential measuring tools for modern class projects. Includes 1" micrometer, combination square with center head and 12" blade, center gage, center punch, 6" flexible steel rule in pocket case, 4" divider, 4" inside caliper, 4" outside caliper and 4" hermaphrodite caliper—all conveniently yet securely arranged in a compact folding case.



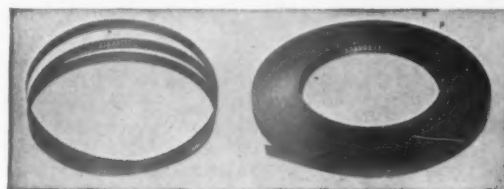
### STARRETT STEEL TAPES AND RULES

STARRETT Steel Tapes are made for every purpose in lengths and graduated to suit every requirement. STARRETT Steel Rules are standard for accuracy, easy to read, made to suit every need or preference.



### STARRETT HACKSAWS

STARRETT Hacksaw Blades cut faster and last longer. There is a STARRETT Hacksaw for every job—Standard Flexible Back, All Hard and "Semi-Flex," "S-M" Molybdenum, "Safe-Flex" Class A—High Speed Steel and 18-4-1 High Speed Steel—for all kinds of hand sawing; "S-M" Molybdenum for light and heavy power sawing and High Speed Steel for power sawing of high alloy metals, stainless steel, phosphor bronze, tool steel, monel, etc.



### STARRETT BAND SAWS FOR METAL, WOOD AND PLASTICS

STARRETT hard edge, flexible back Metal Cutting Band Saws are available in 10 widths, 3 gauges and 8 pitches, in coils of any length or cut to length and welded. STARRETT "Skip-Tooth" Band Saws are available for fast cutting of magnesium, aluminum and other non-ferrous metals, also for wood, plastics and special compositions.



### STARRETT EDUCATIONAL BLUE PRINT SETS

A valuable and practical instruction aid on the use of precision tools. The Set consists of fourteen blue-printed 8" x 10½" punched sheets, each illustrating an important tool and its uses. Furnished to instructors and students at cost—10 cents per set.



### THE STARRETT BOOK for STUDENT MACHINISTS

A handy source of information student machinists must have about tools, machines and modern methods. Prepared in co-operation with leading vocational training experts, it is written in simple shop language, contains more than 200 illustrations and 30 useful reference tables. Available through your local Starrett Tool distributor at one dollar a copy. Descriptive Folder furnished on request.

# THE BLACK & DECKER MFG. CO.

Towson, Maryland

## BRANCHES IN

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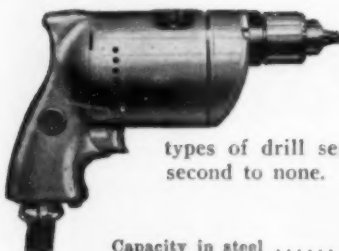
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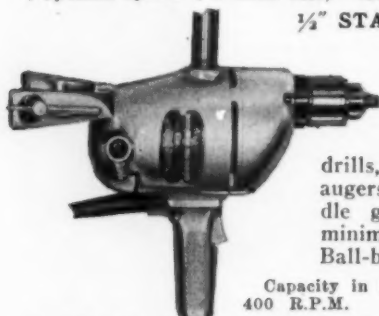
### 1/4" HOLGUN DRILL

A perfectly proportioned "Handful of Power." Completely ball-bearing equipped and built for all types of drill service. Operating balance is second to none.

	Standard Speed Model	Low Speed Model
Capacity in steel .....	up to 1/4"	up to 1/4"
No-load Speed .....	1700 R.P.M.*	500 R.P.M.†
Weight: Net .....	3 lbs.	3 1/4 lbs.
Shipping .....	4 1/4 lbs.	4 1/2 lbs.
Overall length .....	6 3/4"	7 1/2"
Spindle Offset .....	3/4"	3/4"
Cat. No. ....	345	346
Price, complete, specify voltage .....	\$38.00	\$44.00

\* Optional speeds (no extra cost)—2500, 3500 or 5000 R.P.M.  
† Optional speeds (no extra cost)—750, 1000 or 1500 R.P.M.

### 1/2" STANDARD DRILL



The most popular general purpose Electric Drill. Spindle speed is ideal for driving all types of twist drills, Hole Saws and wood augers. Spline mounted spindle gear increases strength, minimizes friction and wear. Ball-bearings throughout unit.

Capacity in Steel, 1/2"; No-Load Speed, 400 R.P.M.

Net Weight, 9 1/4 lbs.; Overall Length, 13 1/4".  
Price, complete, specify voltage—(Cat. No. 361) .....\$58.00  
Available for 32, 115 or 220 volts. On special order only, 125 or 240 volts. Universal Motor.

### 7" STANDARD SANDER



Will also grind, wire brush and do wood planing with attachments.

The popular general-purpose Sander for varied shop use.  
No-Load Speed, 4200 R.P.M.; Net Weight, 12 1/4 lbs.  
Overall Length, 17 1/2"; Pad Diameter, 7".  
Price, complete, specify voltage—(Cat. No. 92) .....\$67.00

### PORTO-SHEARS

(NO. 16 MODEL, Illustrated)

Cut all types of sheet metal quickly, easily and accurately. Accurately follows straight or irregular pattern lines as the cutting edge is always visible.



Specifications	18-gage	16-gage	12-gage
Capacity: in Steel (U. S. Std.) .....	2500	2500	2000
Cutting Speed: No-Load .....	1500	1500	1000
(Strokes per minute): Full-Load .....	5 1/2 lbs.	8 1/2 lbs.	11 lbs.
Weight: Net .....	9 1/4"	12 1/4"	13"
Overall Length .....	258	259	507
Cat. No. (specify voltage) ..	\$82.00	\$85.00	\$135.00
Price, complete .....			

Complete line includes: Drills, Drill Stands, Hole Saws, Screwdrivers, Nut Runners, Tappers, Hammers, Saws, Glue Pot, Bench Grinders, Die Grinders, Portable Grinders, Shears, Sanders, Buffers, Vacuum Cleaners, Valve Shop, Valve Refacers, Valve Seat Grinders and Supplies.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

## ELECTRIC BENCH GRINDERS

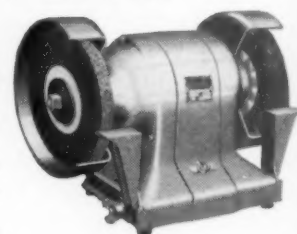
### 6" STANDARD BENCH GRINDER

New, quality Black & Decker unit with full size bearings throughout, wheel guards, tool rests and convenient handle—unusually low in price.

Wheel Size .....6" x 5/8" x 1/2"  
Motor Rating .....1/4 H.P.

Not universal

Price for all 1-phase A.C. voltages and cycles .....\$38.00



### 6" HEAVY DUTY BALL BEARING BENCH GRINDER

For heavy duty service and longer life this unit is equipped with ball bearings, also enclosed wheel guards, tool rests.

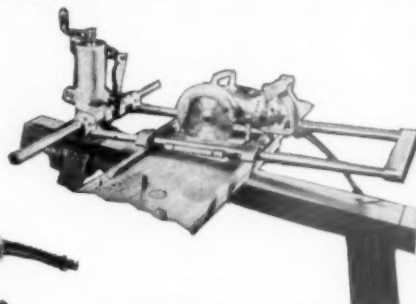
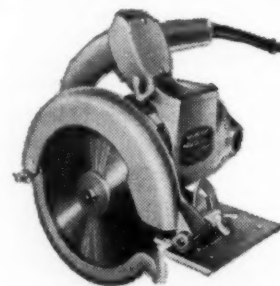
Wheel size .....6" x 5/8" x 1/2"  
Not universal

Motor rating .....1/2 H.P.  
Price for 115 volts, 50-60 cycles, Single phase A.C. voltages only .....\$58.00

## QUICK-SAWS

7" Quick-Saw mounted in Quick-Saw Arm.

8" Quick-Saw shown below.



Quick-Saws feature complete safety, adjustable depth of cut, adjustable angle, increased power, perfect balance, 2-pole instant release switch, sturdy gear and bearing construction. Telescoping guard covers blade except when cutting—springs close as Saw emerges from cut.

Model	Blade Diam.	No-load Speed, R.P.M.	Max. Cut, Depth	Net Wgt.	Ship. Wgt.	Cat. No.	Price
7" Quick-Saw	7 1/4"	3200	2 3/4"	19 lbs.	38 lbs.	260	\$115
8" Quick-Saw	8 1/4"	5000	2 3/4"	20 lbs.	45 lbs.	382	\$135
9" Quick-Saw	9 1/4"	2500	3 1/4"	26 lbs.	54 lbs.	375	\$155

**STANDARD EQUIPMENT:** (all units) 3-wire cable and plug, Combination Rip and Cross Cut Blade, Carrying Case. Universal Motors, operate on A.C. or D.C. Standard Voltage, 115; also available for 220, 125 or 240 on special order.

**QUICK-SAW ARM** (shown above): Quick-Saw Arm quickly converts portable Quick-Saw to versatile radial Saw; multiplies utility of portable saw, improves speed and accuracy on any of these cuts: cross-cut, mitre, bevel, compound angle, ripping.

Net Wt. (not including saw), 42 1/2 lbs.

Angle of Cut—0° to 180°; Bevel Angle—0° to 45°.

Cat. No. 31617. Price Complete .....\$99.50

**COMPLETE CATALOG SENT ON REQUEST.**

# PORTER-CABLE MACHINE COMPANY

3180 No. Salina Street, Syracuse 8, N. Y.

YOUR STUDENTS SHOW MORE INTEREST WITH PORTER-CABLE POWER TOOLS



MODEL A-2

## PORTER-CABLE Guild SANDERS

These safe, easy-to-use portable sanders remove old paint and varnish from cabinets, furniture, woodwork, etc. Faster than 10 pairs of hands. Clean evenly right down to the grain. Produce beautiful, glass-smooth finishes. Lightweight, perfectly balanced, fast cutting. Belt tension and aligning adjustments. Plug into regular 110 volt outlet.

Model No.	Belt Size	Price
A-2 (Guild)	2" x 21"	\$ 59.50
A-3	3" x 24"	107.00
BB-10 (with dust-bag)	3" x 27"	150.00

## PORTER-CABLE Guild SAWS

These are the balanced saws, designed for easy, safe, one-hand use. Thumb screw adjustment for angle and depth of cut. Broad base prevents tilting and veering. Saw rests firmly on work after cut-off has been made. In-line helical drive delivers much more power to the blade and prevents wrist twist and torque strains. Porter-Cable saws greatly speed up cutting and fitting in carpentry and maintenance work. Capacities available for every need.



Model No.	Max. Depth of Cut	Price
A-4 (Guild)	1 1/4"	\$ 49.50
A-6 (Guild)	2"	65.00
A-8 (Guild)	2 3/4"	87.00
K-75	2 1/2"	120.00
K-89	2 3/4"	130.00
BK-10	3 3/4"	175.00
BK-12	4 3/8"	215.00
ERA (Radial Arm)		190.00



## PORTER-CABLE RADIAL ARM

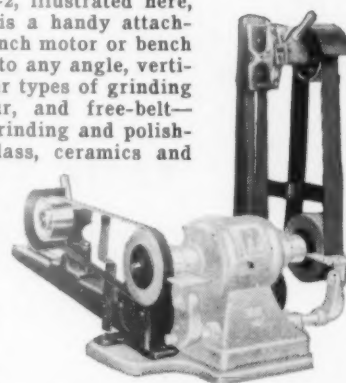
Using proper adapters, retractable Radial Arm, Model ERA, doubles the utility of your Speedmatic or Guild Saw. The saw can be set to any cutting position . . . raised, lowered, swung . . . with accurate, automatic indexing at 45°

either right or left; 90° for ripping. \$190.00 Complete with legs.

## PORTER-CABLE BENCH GRINDER MODEL N-2

Bench Grinder Model N-2, illustrated here, uses abrasive belts, and is a handy attachment for connecting to bench motor or bench grinder. It is adjustable to any angle, vertical to horizontal. All four types of grinding—contact, platen, contour, and free-belt—can be done. Ideal for grinding and polishing all metals, wood, glass, ceramics and many other materials. Generates radii, grinds contours, sharpens tools, deburrs, removes mold marks and flash. Model N-2—Price: \$39.50.

The bench grinder, available as Model CN-2 comes complete with base for grinder and motor, platen, idler and drive pulley, guard, and two belts. Model CN-2—Price: \$69.50.



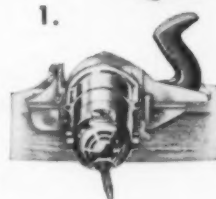
## 1 INTERCHANGEABLE MOTOR POWERS THESE 3 TOOLS!

CLASSES CAN DO 101 WORKING JOBS  
... WITH MINIMUM TOOL INVESTMENT

### Guild PLANE

Hardened steel cutter. Makes fast accurate surfacing cuts. Fits doors, trim of any kind. A-1 for bookcases, cabinets, tables.

Guild Plane Attachment,  
Model 1102.. \$25.00  
Guild Plane, Model 101..... \$65.00  
(Complete with motor)



### Guild ROUTER

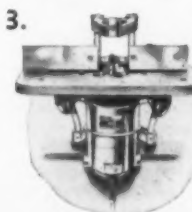
Add router base to motor. For rabbeting, chamfering, coving, inlay veining—fancy grooving, edging, recessing, cut-outs, corner cuts.

Guild Router Base, Model 101 \$ 7.45  
Guild Router, Model 100..... \$47.50  
(Complete with motor)

### Guild SHAPER

Simply clamp Router under shaper table. Attaches to work bench. For shaping circular pieces, strip moulding, irregular curves, ornamental woodwork.

Shaper Table, Model 5004.... \$24.00  
Complete with Router,  
Model 102.. \$71.50



All three tools, with one interchangeable motor ..... \$96.50

See other Porter-Cable page in Maintenance Section.

WRITE DIRECTLY TO PORTER-CABLE FOR DETAILED LITERATURE ON ANY OF THE TOOLS SHOWN HERE

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



# SKILSAW, INC.

5033 Elston Ave., Chicago 30, Ill.



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St. Louis  
San Francisco  
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TRADE MARK

## TRAIN STUDENTS with PROFESSIONAL TOOLS

Vocational training students learn faster, do better work when using the tools widely preferred in the industrial, contracting, installation and maintenance fields. Help them become better fitted for jobs, better prepared to advance more rapidly, by teaching with professionally preferred SKIL Tools.

School maintenance men know the time and labor saving possible with these modern tools on such school jobs as: refinishing desks and blackboards, installing equipment, sanding floors, building partitions.

Ask your school supplies distributor for a copy of the new SKIL TOOLS Catalog



### SKIL BELT SANDER MODEL "9" (Formerly ZP) 3" Wide Belt

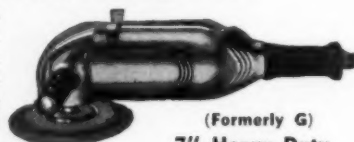
Most popular sander for schools. Ideal for manual training and school maintenance. Produces a perfectly smooth, ripple-free

finish... speeds all sanding of wood, metals, stone and composition materials. Belt easily removed or centered. Momentary contact trigger switch for safety. Free belt speed 1200 ft. per minute. Size overall 4 1/4" x 13 1/4" x 7" high. Net weight 13 1/4 lbs. Equipped with resilient backed metal pad; 10 ft. of 3-conductor cord and connector; medium grade SKIL Sander Belt; lubricant. Standard voltage 115, D.C. or A.C.

MODEL "9", each .....\$105.00  
2 1/4" and 4 1/2" SKIL Belt Sanders also available

### SKIL DISC SANDER MODEL "11"

For grinding down welding beads, removing scale from castings, etc. Used with sanding discs, wire cup brushes, cup grinding wheels, rubbing pads and polishing bonnets. No-load speed 3600 R.P.M. Length overall 16 3/4" not including pad. Net weight 12 1/2 lbs. Equipped with 10 ft. of 3-conductor cord and connector; detachable handle; tool rest; 7" pad; 3 sanding discs, wrench. Standard voltage 115, D.C. or A.C.



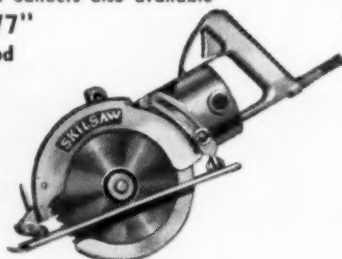
(Formerly G)  
7" Heavy Duty

MODEL "11", each .....\$74.50  
2 other SKIL Disc Sanders also available

### SKIL SAW MODEL "77"

#### Cuts 2 3/8" Deep in Wood

The greatest value among 7 1/4" saws. Crosscuts 2" rough lumber, bevel-cuts 2" dressed lumber at 45°. Quick adjustment for both depth and bevel cutting. Cuts metal, stone, concrete, tile and composition. Maximum cutting in wood 2 3/8". Automatic telescoping guard shields saw blade. Length overall 17 1/4". Net weight 15 lbs. Equipped with one combination blade; 10 ft. of 3-conductor cord and connector; steel carrying case; wrench; lubricant. Standard voltage 115, D.C. or A.C.



MODEL "77", each .....\$115.00  
6", 8 1/4", 9", 10", 12" and Groover SKIL Saws also Available

### MODEL "80" SKIL DRILL

#### 1/2" Standard Duty

Only 11 1/2" long overall—3 1/2" wide—compact, streamlined Model "80" is ideal for use in close quarter work where the usual 1/2" drill cannot get in. Just right for maintenance drilling. Powered for constant production work on metals. Capacity in steel, 1/2"; in hardwood, 1 1/4". No-load speed 450 R.P.M.; full load 300 R.P.M. Equipped with 1/2" capacity 3-jaw Jacobs chuck and key; 7 ft. 3-conductor cord and connector; detachable pipe handle. Standard voltage 115, D.C. or A.C.

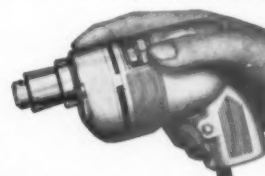


MODEL "80", each .....\$58.00

### MODEL "45" SKIL DRILL

#### 1/4" Constant Duty

Puts a world of drilling power right in the palm of a man's hand... for fastest drilling in even the tightest spots. Only 6 5/8" long. Weighs just 2 3/4 lbs. Ideal for aircraft, automobile, radio, cabinet and other drilling. Capacity in steel 1/4"; in hardwood 1/2". No-load speed 1800 R.P.M.; full load 1050 R.P.M. 2500, 3500, 5000 R.P.M. no extra cost. Slow speeds 550, 750, 1000 R.P.M. \$6.00 extra. Equipped with 1/4" 3-jaw Jacobs chuck and key; 7 ft. 3-conductor cord and connector. Standard voltage 115, D.C. or A.C.



MODEL "45", each .....\$38.00

Space does not permit listings of all 28 SKIL Drill models, with capacities ranging from 1/8" to 3/8" in steel. Whatever the portable drilling requirements, there's a SKIL Drill to do the job. See your school supplies distributor.

### SKIL DRILL BENCH STANDS

Quickly convert all SKIL Drills into stationary drill presses. For many types of work, these stands eliminate the need for costly drill presses, and permit an economical method of providing a greater number of drill presses for classroom use.

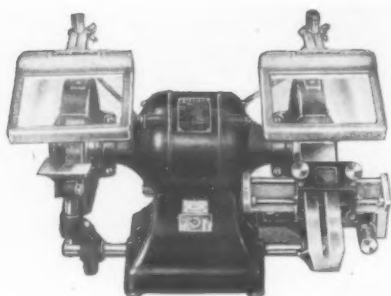
Exclusive rack and pinion gearing provides highest leverage ratios in the bench stand field. Construction is heavy and of finest materials for rugged service. There's a SKIL Drill bench stand for every current SKIL Drill, and many old models. Priced at \$27.50 and \$38.00.



# STANLEY ELECTRIC TOOLS

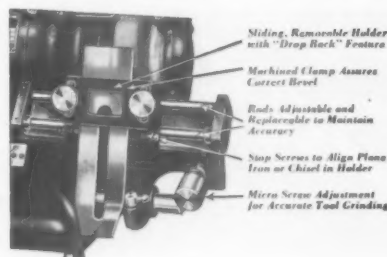
EDUCATIONAL DEPARTMENT

New Britain, Connecticut



## No. 677 EDGE TOOL GRINDER

Every wood-working shop needs this improved, full ball bearing Bench Grinder. Powered by a  $\frac{1}{3}$  H.P. induction motor, fully enclosed, it operates at the correct speed for edge tool grinding. Equipped with "Flud-Lite" Eye Shields, one Adjustable Tool Rest, and the Plane Iron and Chisel Grinding Fixtures.



## PLANE IRON AND CHISEL GRINDING FIXTURE

Standard equipment with the No. 677 Grinder, keeps edge tools accurately beveled. Takes plane irons up to  $2\frac{5}{8}$ " wide and chisels of any size. Micro screw feed adjustment.

## IMPROVED DESIGN!



## HAND ROUTER No. 28

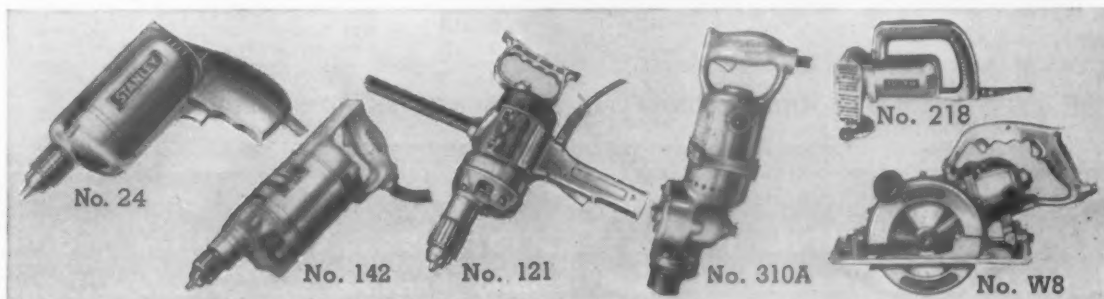
Fast—18,000 R.P.M.—assuring a smooth finish that makes sanding practically unnecessary. For Shaping, Inlay Work, Routing, Templet Work, Veining, Grooving, Rabbeting, Corner Beading, etc. The power unit may also be quickly attached to a Beading and Fluting unit or to a shaper table. Provides a great variety of practical cuts and a wide range of decorative operations at a very low cost.



## STANLEY "FLUD-LITE" EYE SHIELD No. 600

Effective eye-protection combined with better vision. Two light bulbs with reflectors floodlight work area, help prevent injuries. Adjustable up and down, and tilts to suit operator's position. Cannot be moved to non-guarding position without dismantling. Standard equipment on No. 677 Grinder, as shown above. Can be attached to all similar bench or belt-driven grinders. Larger size eye shield also available.

## WRITE FOR LATEST CATALOGS



THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# AMERICAN STEEL FOUNDRIES

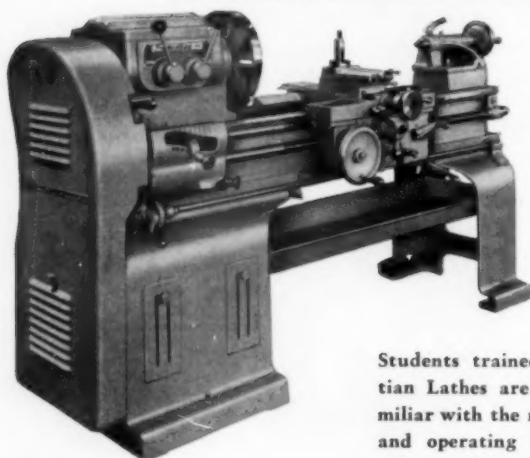
KING MACHINE TOOL DIVISION

Cincinnati 29, Ohio

## Sebastian LATHES

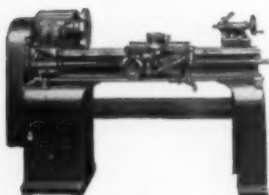
GEARED HEAD

**The Ideal Training Lathe . . . Equipped With  
Essential Production-Lathe Features**



### STANDARD TYPE "R" GENERAL PURPOSE LATHES

Made in 12", 16",  
and 20" sizes.  
(16" shown here)

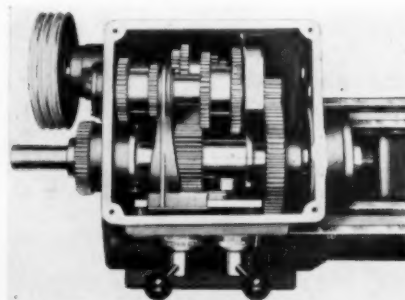


12" GENERAL PURPOSE

#### SEBASTIAN GEARED HEADSTOCK

Interior view showing  
sliding gear  
transmission

Descriptive Literature and  
Specifications Sent Promptly  
On Request



Students trained on "King-made" Sebastian Lathes are *thoroughly* trained. Familiar with the many superior construction and operating features of the medium-priced Sebastian, they are equipped to handle *any* type of engine lathe—even the largest production lathes. In accuracy, versatility, operating ease, longer service life, the modern Sebastian is definitely the outstanding value in the medium-priced lathe field. Get the facts—see for yourself!



BUILDERS OF  
WORLD-RENOUNDED "KING"  
BORING AND TURNING MACHINES

### LEADING FEATURES

8-SPEED GEARED HEAD on all lathes.

TIMKEN BEARINGS on all headstock shafts. Pre-loaded *precision* Timken Bearings on spindle.

OVERSIZED, HEAT-TREATED STEEL GEARS in headstock.

REVERSE IN APRON for feeds.

APRON CONTROL for start, stop, and reverse of lathe spindle. (Standard on lathes with beds 10' and longer.)

ACCURACY .0005" at every point of alignment.

AUTOMATIC SPLASH LUBRICATION for all gears in headstock.

57 FEED and THREAD CHANGES.

#### PRINCIPAL SPECIFICATIONS

Standard Type "R" General Purpose Lathes

LATHE SIZE	12"	16"	20"
Swing over bed . . . .	12"	16 1/4"	20 1/4"
Swing over carriage . .	8 3/4"	10 1/2"	14 1/4"
Length of bed . . . .	4' to 6'	5' to 14'	6' to 16'
Distance between centers	23" to 47"	26" to 134"	32" to 152"
Hole through spindle . .	1—5/16"	1—5/16"	1—9/16"
Morse Taper of centers	No. 2	No. 3	No. 4
Weight, crated—approx.	(4') 1425 lbs.	(6') 2525 lbs.	(8') 3600 lbs.

DISTRIBUTORS IN PRINCIPAL CITIES. CONSULT YOUR CLASSIFIED TELEPHONE DIRECTORY, OR WRITE US.

American Steel Foundries

**KING MACHINE TOOL DIVISION . . . Cincinnati 29, Ohio**

*Builders of King Vertical Boring & Turning Machines and Sebastian Lathes*

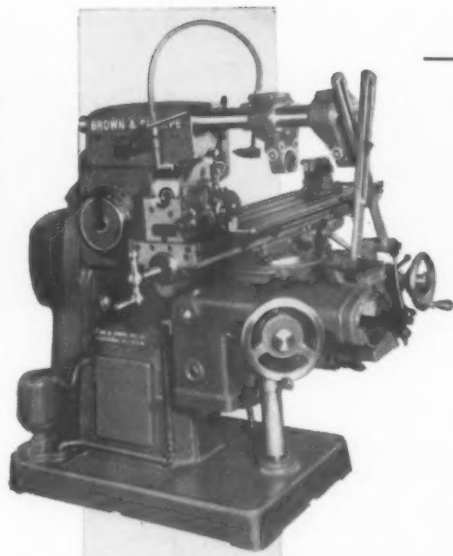
THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



# BROWN & SHARPE MFG. CO.

Providence 1, R. I.

Established in 1833



NO. 2 UNIVERSAL MILLING MACHINE, LIGHT TYPE



NO. 2 VERTICAL MILLING MACHINE 5 H.P.



NO. 13 UNIVERSAL AND TOOL GRINDING MACHINE



NO. 2 SURFACE GRINDING MACHINE



NO. 000 AUTOMATIC SCREW MACHINE

## EQUIP YOUR STUDENTS FOR the FUTURE

... train them on machines  
used in Industry

Assure maximum returns on your investment by equipping your vocational training departments with machines designed to give basic and reliable service for years to come.

Brown & Sharpe machines have earned a world-wide reputation for their unusually long life as well as simplified operation, high accuracy and versatility. Five typical ma-

chines are shown here. All have the basic and enduring features that make Brown & Sharpe machines such wise and profitable investments over the years.

Investigate these machines of the present *designed for the future*. Complete details of any listed below will be sent on request. Brown & Sharpe Mfg. Co., Providence 1, R.I.

### MILLING MACHINES:

Universal • Plain (including manufacturing type) • Vertical.

### GRINDING MACHINES:

Universal • Plain • Surface • Cutter & Tool.

### SCREW MACHINES:

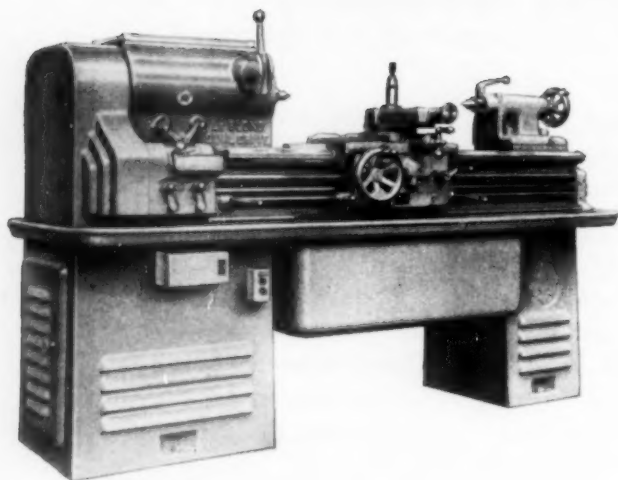
Automatic (including screw threading, pinion turning and cutting-off types) • Wire Feed.

# THE R. K. LeBLOND MACHINE TOOL CO.

Cincinnati 8, Ohio

Largest Manufacturer of a Complete Line of Lathes

SALES OFFICES: New York, Chicago, Detroit



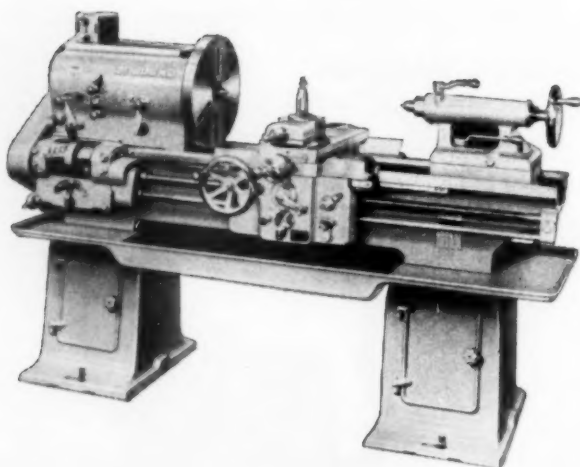
**LeBLOND DUAL DRIVE**—For the shop offering thorough training in modern lathe operation, a LeBlond Dual Drive is essential equipment. For only Dual Drive can demonstrate all these important new operating principles:

- Single-lever spindle speed shifting
- Running at high speeds: 1800 rpm maximum
- Apron-controlled spindle start and stop
- Simplified feed and thread settings on an enclosed quick change box
- Use of automatic length stops.

Dual Drive has a swing capacity of 15" over bed and carriage wings, 9½" over compound rest. Center distances start at 30". Furnished with 3-hp main drive motor, multiple automatic length stops, chip pan and two cabinet legs.

**LeBLOND REGAL LATHES**—Winner in the low price field • Regals are made in 13" bench model and six standard floor models 13" through 24". Plain and sliding bed gap and turret models also available.

All Regals are furnished with: Leadscrew and feed rod • geared headstock • taper key drive spindle nose • quick change box • one-piece apron • main drive motor. Electric brake and apron control standard equipment on 21"-24" models; available as extras on all other sizes.



REGAL SPECIFICATIONS

	13"	15"	17"	19"	21"	24"
Swing over bed and carriage wings	13½"	15¼"	17¾"	19¼"	22¼"	25¼"
Swing over compound rest	8¾"	10"	10½"	12"	13½"	17"
Distance between centers, start—	18"	18"	30"	30"	36"	36"
Domestic shipping weight, lbs.	1165	1240	2550	2760	4340	4545

## ELECTRIC DUPLICATING ATTACHMENT

Fits any LeBlond Regal or Dual Drive . . . excellent for duplicating work between centers or for profile facing. Sold as an attachment. Complete your students' education in this important new metalworking technique.

## NO. 2 CUTTER GRINDER

Teach tool grinding right in your own shop with the most flexible cutter grinder of them all . . . the LeBlond No. 2, with four speeds—3100, 4000, 5100 and 6500 rpm—all controlled by a single lever.

## REGAL AND DUAL DRIVE ATTACHMENTS

Broaden the scope of your lathe training with such productive Regal and Dual Drive attachments as special chucking devices, bed turrets, tool and work rests, thread chasing and carriage stops, chasing dial, and taper, milling and grinding attachments.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# LOGAN ENGINEERING COMPANY

4901 West Lawrence Avenue, Chicago 30, Ill.



**\$585<sup>00</sup>**

**PLUS FREIGHT**

NO. 955 LOGAN LATHE

**the Logan  
'955'  
lathe with 1"  
collet capacity**

**accurate  
durable  
versatile  
safe**

Many other Logan 9", 10",  
and 11" Lathes and 8" Shap-  
ers equip school shops for  
safe, practical training.  
PRICES FROM \$169.50  
CATALOG ON REQUEST

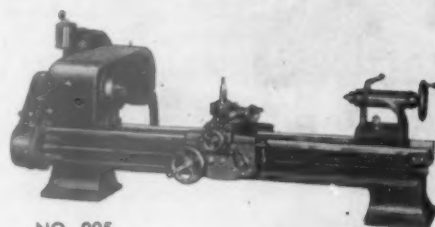
The 955 has the specifications and tolerances of lathes priced up to \$1,000.00. With 1" collet capacity, 11" swing, 1 $\frac{3}{8}$ " spindle hole, and center distances of 24" and 36" it handles larger-than-average school shop work. The ball bearing spindle mounting assures sustained accuracy and requires no adjustment for any speed from 45 to 1500 rpm. Less than .0005" total spindle runout 12" from the bearing, and bed ways precision ground to within .0005" maximum variation are typical 955 construction tolerances. The entire lathe is ruggedly built and mounted on a space-saving steel pedestal base. Self lubricating bronze bearings provide extra protection at vital wear points. The underneath drive and moving parts are enclosed yet accessible.

In brief, the 955 is an accurate, versatile, safe-to-operate lathe with the durability to stand up under hard use. Its price permits more lathes per school, more work-stations per student, and more thorough training for a given investment. See the 955 at the nearest Logan Dealer Display Room, or write for the No. 955 Bulletin today.

*Prices Quoted In This Advertisement Are Subject to Change Without Notice. Logan Prices As Well As Logan Performance Will Continue to Offer Substantial Economies.*



LOGAN 8" SHAPER



NO. 905  
LOGAN PLAIN CHANGE GEAR 11" LATHE  
WITH 1" COLLET CAPACITY

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

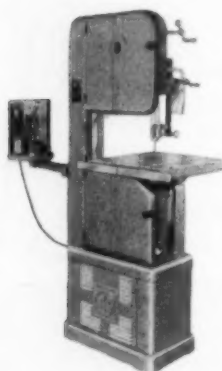


## WALKER-TURNER DIVISION KEARNEY & TRECKER CORPORATION

Plainfield, New Jersey

### School Shop to Industrial Plant...WALKER-TURNER POWER TOOLS FOR METAL AND WOODWORKING

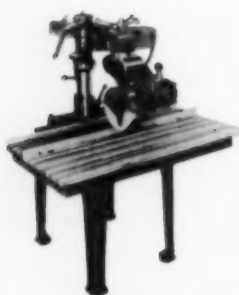
Walker-Turner Power Tools for school shop work are the same machines used by industry wherever metals, wood or plastics are to be drilled, cut, formed or shaped. Functional design, they're easy to use, safe to handle. See your nearby Walker-Turner distributor for suggestions when planning your school shop. Send for complete catalog.



#### BAND SAWS WITH NEW, EXCLUSIVE AUTOMATIC POWER FEED

*For Metal, Wood or Plastics*

14" and 16" sizes. Speeds available for all types of work. Tables have mitre gauge grooves—tilt to 45°. Table size: 16" model 18" x 19"; 14" model—16" x 16". Attachments for wide variety of operations.



#### 900 RADIAL SAW

Works wonders ripping, mitring, shaping, tenoning, rabbeting, dadoing, routing and on many other jobs. New, offset drive provides increased efficiency. Greater capacity with smaller blades—less power per cut. Effortless operation—full visibility.

Operates at any angle. 12" blade cuts 4 1/8" deep. Ram travel 24".



#### 15" DRILL PRESSES

Available in bench and floor models. Wide speed range. Four step spindle and motor pulleys develop 600, 1250, 2440 and 5000 r.p.m. with 1740 r.p.m. motor. Slo-speed attachments available. Adaptable for sanding, grinding, mortising, shaping and many other operations.

New head design—4 ball bearings, six spline spindle. Spindle travel 4 1/4".



#### 24" JIG SAW — 4 SPEED

Patented blade tensioner makes possible rapid blade changes and tension adjustments while machine is running. New built-in-base blower delivers constant air pressure. Adjustable saw guide and hold-down.

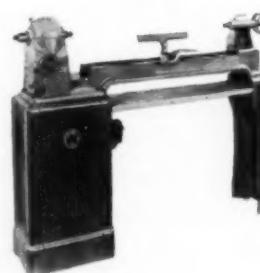
Arm movable to sides, removable for large work. Table size: 12 3/4" x 16", tilts to 45°. Four speeds: 600, 900, 1250, 1740 r.p.m. with 1740 r.p.m. motor.



#### 6" JOINTER

Dual purpose guard permits work to be fed under it while operator's left hand, resting on it, applies necessary pressure. Planes ribbon thin with absolute safety.

Texrope drive with triple V-belts permits efficient close-coupled motor connection. Solid steel 3-knife cutterhead, rabbets to 1/2" deep. Speed 4200 r.p.m.



#### VARIABLE SPEED LATHE

Heavy cast iron headstock and double row pre-loaded spindle ball bearings make it ideal for woodworking and metal spinning. Spindle speeds, changed while machine is running, are controlled by a hand wheel on headstock. Swing over gap 15 1/2", over bed 12", distance between centers 38". Speeds with 2" pulley 300 to 1300 r.p.m.; with 4" pulley 600 to 2600 r.p.m.



#### 20" DRILL PRESSES

*Hand or Power Feed*

Heavy one-piece cast iron head is line bored for accuracy. 6" spindle travel, adjustable spring return. Capacity 3/4" in steel, 1" in cast iron. Spindle speeds 400, 800, 1200, 1800, 2600 r.p.m. using 1740 r.p.m. motor. No. 2 Morse Taper spindle is splined for better balance. Available in bench, floor and multi-spindle models.

# WALKER-TURNER DIVISION

## KEARNEY & TRECKER CORPORATION

Plainfield, New Jersey



### 12" TILTING ARBOR SAW

Completely new design. Rip fence locks front and rear—micrometer adjustment—"T" slots for miter gauge. Improved safety guard and splitter.

Capacity  $4\frac{1}{2}$ " dado  $1\frac{1}{2}$ ". Saw speed 3600 r.p.m. 5 h.p. 3 phase or 3 h.p. single phase motor. Table 48" wide x  $38\frac{3}{4}$ " deep.



### RADIAL DRILL PRESS

Drills to center of 62" circle or anywhere on sheet stock up to 5 ft. wide. Handles all drilling and tapping jobs to  $\frac{1}{2}$ " in cast iron. Built-in ball bearing jackshaft gives wide speed range and utility. Drill head, ram and cradle may be swung in complete circle. Locks securely in any position.

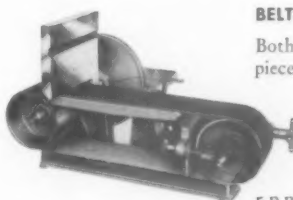
Six spline, full floating type spindle travels  $4\frac{1}{4}$ ". Ram travel 18". Fifteen spindle speeds; from 160 to 8300 r.p.m. using 1740 motor, 110 to 5400 using 1140 motor.



### 9" TILTING ARBOR SAW

Completely new. Safety guard and splitter supplied. "V" belt drive. Aluminum rip fence with micrometer adjustment.

Capacity  $3\frac{1}{8}$ ", 2" at 45°. 6" dado  $1\frac{1}{8}$ ". Table size with extensions  $41\frac{1}{4}$ " x  $40\frac{1}{2}$ ". Spindle speed 4000 r.p.m. Available with or without welded steel sub-base.



### BELT AND DISC SURFACER

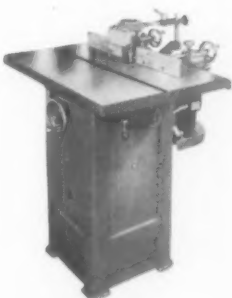
Both tables tilt from 90° to 45°. One piece cast iron frame, dust-sealed ball bearings. V-belt drive with built-in guard. Aluminum alloy sanding disc, 10". Belt 4" wide, distance between pulley centers,  $18\frac{1}{2}$ ". Belt speeds 900, 1760 and 3200 r.p.m., disc 660, 1280 and 2350 r.p.m.



### MOTOR GRINDERS

Totally enclosed motor—special shaft seals prevent dust from damaging vital parts. Motor end bells are extended, allowing use of both sides of grinding wheels. Heavy-duty wheel guards with removable covers. Adjustable tool rests. 7" wheel operates at 3450 r.p.m. with  $\frac{1}{2}$  h.p., single phase motor.

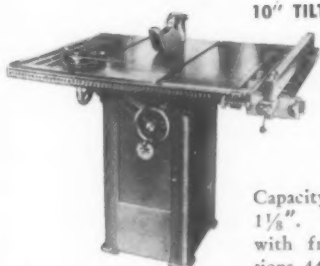
Other sizes and combination sander-grinder available.



### VERTICAL SPINDLE SHAPER

Two speeds, 7000 and 11000 r.p.m., with dynamically balanced pulley for smooth operation. Independently adjustable guides. Complete cutter guarding. Graduated spindle adjustment. New type nylon cord reinforced V belt drive.

Spindle travel 3" on dovetail ways. Cast grey iron table, 22" x 33". One piece heavy gauge steel base.



### 10" TILTING ARBOR SAW

Triple V belt drive. Safety guard, splitter and two anti-kick back pawls. Fence locks front and rear. Hand wheel tilts entire arbor and drive unit, stops at 45° and 90°.

Capacity  $3\frac{1}{8}$ " deep with 10" blade, dado  $1\frac{1}{8}$ ". Table  $26\frac{3}{8}$ " wide x  $32\frac{1}{2}$ " deep with front extension. With side extensions  $44\frac{3}{4}$ " wide. Speed 3800 r.p.m.



## WALKER-TURNER DIVISION

PLAINFIELD, NEW JERSEY

DRILL PRESSES — HAND AND POWER FEED • RADIAL DRILLS, SAWS, CUT-OFF MACHINES • TILTING ARBOR SAWS • BAND SAWS • BELT AND DISC SURFACERS • SPINDLE SHAPERS • JOINTERS • LATHES • FLEXIBLE SHAFTS • MOTOR GRINDERS

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# DUDLEY LOCK CORPORATION

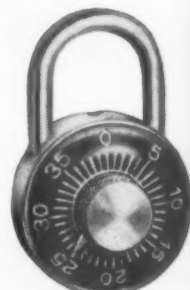
564 West Monroe Street, Chicago 6, Illinois

AS THE PIONEER in the use of combination padlocks for schools, Dudley has developed a type of locking equipment that has resulted in a simplified easy control, trouble-free locker system operation. Dudley locks are used by the majority of schools because they give extra service, extra protection and extra value.

## SPECIFY DUDLEY



**RD-2 ROTODIAL.**  
Stainless steel case. A strong durable lock for lockers, scientifically tested, eliminates pilferage, is fool-proof, locks automatically disarranging all tumblers and dial.



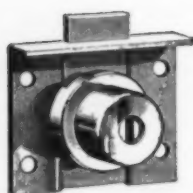
**RP-5 ROTOPOINT.**  
Brass case. A sturdy constructed lock for lockers. Locks when shackle is pushed into the lock case, disarranging all tumblers.



★ **S-540.** Masterkeyed combination lock for lockers with automatic latch release. Locks automatically disarranging tumblers and dial. Combination instantly changed with special reset key without removing any part of lock from locker.



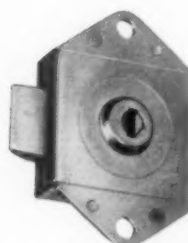
★ **P-570.** Self-locking. Tumblers and dial disarranged on opening and dial moved to a new position. Masterkeyed alone or in the same series as other Dudley masterkeyed locks.



**W-510.** Key lock for wood drawers and cabinets  $\frac{7}{8}$ " and  $1\frac{1}{8}$ " thickness. Keyed different or alike. Masterkeyed alone or in same series with other Dudley masterkeyed locks.



**S-535.** Key lock for lockers and steel cabinets. Keyed different or alike. Masterkeyed alone or in same series with other Dudley masterkeyed locks. With bevel spring bolt only.



**L-4.** Combination lock with square dead bolt for lockers without automatic latch release. Combination readily changed.

Different types of masterkeyed locks—S-540, P-570, S-535, W-510—used on different kinds of equipment in the same department can be furnished under the same master, if desired, simplifying supervision and control.



Dudley representatives are lock specialists experienced in the school lock field. They are competent to make a survey of the locking requirements and to recommend a system that will meet your needs. **Write us today!**

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



# MASTER LOCK COMPANY

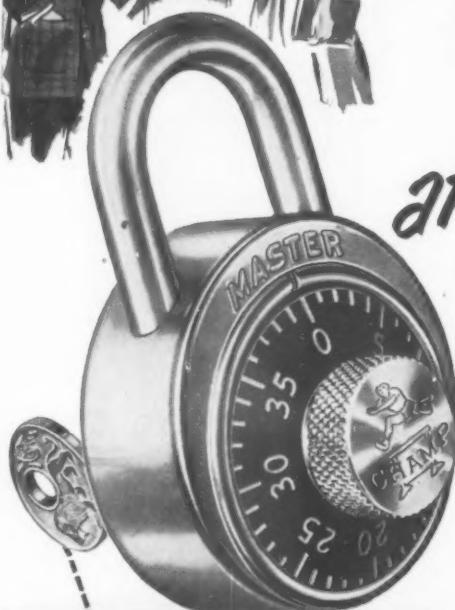
Milwaukee, Wis.



## Finest Locker Security by Master

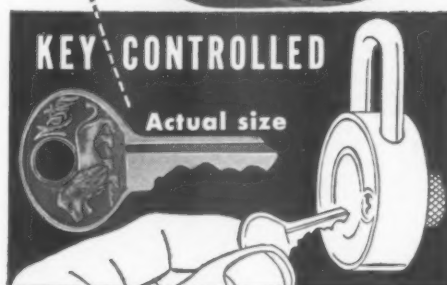
WORLD'S LEADING PADLOCK MANUFACTURERS

*at Low Prices  
that fit your budget*



### KEY CONTROLLED COMBINATION LOCK No. 1525

For student and school, here's locker security and control at its best — PLUS a new low price for easy budgeting. Your control key opens every locker quickly, easily. Your students get a trouble-free, smooth-working combination lock — handsome in design, strong in construction — built to give dependable, long-lasting protection. Compare quality, value and price! You'll find Master your best combination lock buy.



#### BRASS CYLINDER PIN-TUMBLER MECHANISM

Master's key control feature, which operates from the back of the lock (see above), employs a precision-built, brass cylinder, pin-tumbler mechanism — the FINEST security known to lock-making. One control key is furnished at nominal cost with each installation. Additional keys available if required.

#### STRONG CONSTRUCTION

Master No. 1525 is constructed of hard wrought metals — a husky double-wall case, brass over steel, houses a locking mechanism that is built like the lock on a safe. Strong steel shackle is automatically locked by a patented double-acting locking lever — requiring all three numbers to be redialed before opening.

WRITE US TODAY ABOUT YOUR LOCK PROBLEMS. ADDRESS DEPT. 14,  
MASTER LOCK COMPANY, MILWAUKEE 10, WIS.



Master also offers a complete line of keyed padlocks in a wide range of prices, including the world-famous Master Laminated Secret Service Series. Keyed-alike and master-keyed sets available for school use.

### Master "CHAMP" COMBINATION LOCK No. 1500



Master's No. 1500 — rugged, dependable, long-time school favorite. Built to withstand years of hard use. Constructed exactly like the No. 1525 but without key control. A true "Champ" for quality and value . . . strength and security — and priced to make budgeting easy.

**Master Lock Company, Milwaukee, Wis. • World's Leading Padlock Manufacturers**

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# NATIONAL LOCK COMPANY

Rockford, Illinois

## BRANCH OFFICES

Chicago  
Chattanooga  
Cincinnati  
Cleveland  
Columbus  
Dallas  
Denver

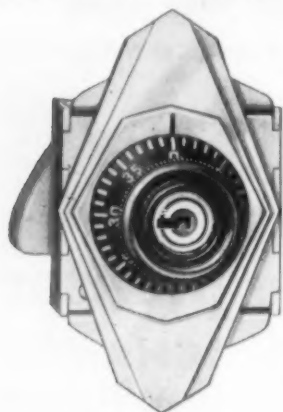
Detroit  
Evansville  
Grand Rapids  
High Point, N. C.  
Indianapolis  
Jamestown  
Kansas City, Mo.



Los Angeles  
Martinsville, Va.  
Milwaukee  
New York  
Portland  
Rochester  
St. Louis

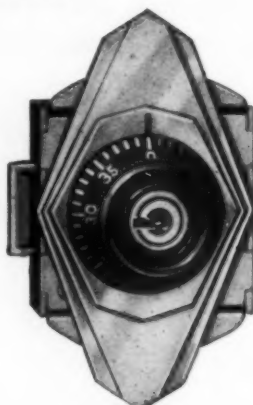
St. Paul  
San Francisco  
Syracuse  
Winnipeg, Man.  
York, Pa.  
Toronto, Ont.

**R**OCKFORD COMBINATION LOCKER LOCKS are made for standard Steel Lockers of any style or make. It is the complete line assuring the utmost in security, convenience, simplicity and durability. Rockford Locks have proven their worth in thousands of Educational Institutions. For simplified and complete supervision and control select the Rockford Line.



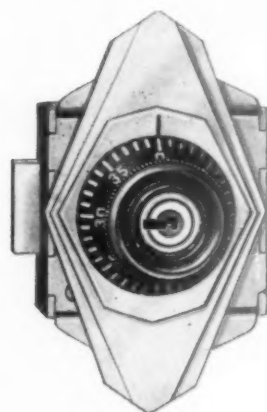
NO. 68-267

Master Keyed Combination Self Locking, for use on Lockers having spring latch bar. Over 10,000 different combinations available. No bolt or rivet heads visible from outside. Can also be furnished without Master Key feature. Escutcheon plates for above locks are supplied in a beautiful Bright or Satin Chromium plated finish.



NO. 68-269

For use on Box type Lockers having no latch bar. Lock has beveled spring bolt. Closing door locks lock and spins dial concealing last figure of combination. Furnished with or without Master Key feature.



NO. 68-271

Master Keyed Combination Dead Bolt Lock having square end dead bolt. Lock does not have self-locking feature. Combinations of this lock and Nos. 68-267 and 68-269 can easily be changed by removing escutcheon plate and turning dial.



NO. 68-265

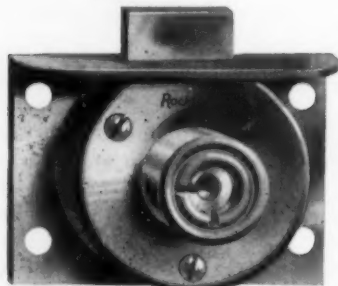
## COMBINATION SHACKLE LOCKS

Keyless Combination Self-locking Shackle Lock that is fool proof, secure and durable. Inserting shackle upsets combination by turning dial. Must be completely re-dialed to open. Over 8,000 different combinations available. This is a very popular lock in the Rockford Line. Lock case can be Chromium Plated and dial is black with white figures.

Master Keyed for ease and convenience of supervision. Can be Master Keyed with all built-in Locks shown above, or Laboratory Lock shown below. Students operate lock by combinations, while officials gain access by use of Master Key. Dial is locked against rotation when shackle is open. This lock has a stainless Steel case.



NO. 68-264



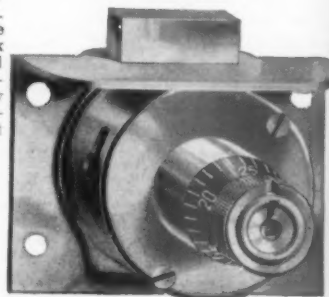
NO. 68-263

## NO. 68-253 VOCATIONAL AND LABORATORY EQUIPMENT LOCK

This Lock was designed for use on Vocational and Laboratory Furniture. It is of heavy solid brass construction to withstand hard usage and acid fumes. It is available with master key or sub-master key features, if desired. Half mortise application for either right or left hand doors or for drawers.

## NO. 68-259 COMBINATION DRAWER LOCK

Combination Master Keyed Laboratory Drawer or Door Lock. Combination can quickly be changed without removing lock from mortise. Lock is of Solid Brass construction and is not affected by ordinary Laboratory fumes and acids. Lock is reversible for use on right or left hand doors.



NO. 68-259

Illustrated here are only a few of the many School Locks available in the Rockford Line. Ask for illustrated folder showing complete line.

# THE YALE & TOWNE MFG. CO.

Stamford, Conn.

*Maximum security*—the most protection, dollar for dollar. *Maximum efficiency*—quick, easy operation reduces congestion in locker rooms.

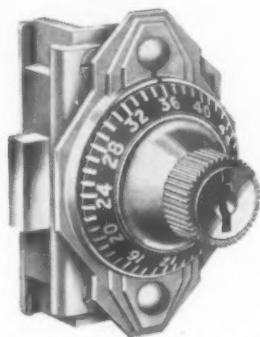
TRADE **YALE** MARK

## YALE COMBINATION LOCKER LOCKS

### *Exclusive YALE Features*

**Maximum Security.** Combination dialed on three positive numbers. Combination must be known and cannot be found by manipulating dial. **Combination Disperser** automatically upsets combination as lock is locked. A double safeguard. Acts as a defense against tampering. **Combination Changeable** with

every change of locker occupant—without removing lock from door. Feature secluded in back of lock in same secure manner as in Yale Bank Locks. **Supervisory Control** of a group of lockers or the collective groups of a city school system obtained by the **Yale Emergency Key Control**. The key used is assigned exclusively to these locks.



**Lockers with Automatic Bolt Release**

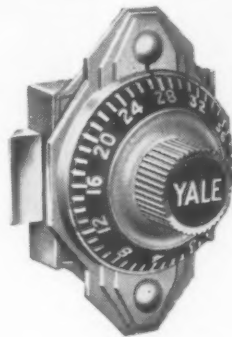
*New locking principle*—automatic self-locking vertical sliding bolt

*Emergency Key Controlled*

No. L3374-CM, Cadmium finish  
No. L3374-DZ, Chromium finish

*Dial Operated Only*

No. L3364-CM, Cadmium finish  
No. L3364-DZ, Chromium finish



**Steel Compartment and Box Type Lockers**

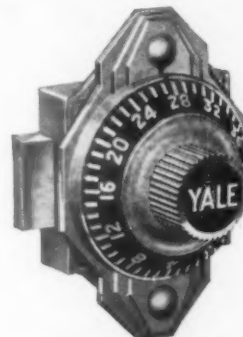
*Beveled spring-bolt, automatic self-locking*

*Dial Operated Only*

No. L3369-CM, Cadmium finish  
No. L3369-DZ, Chromium finish

*Emergency Key Controlled*

No. L3379-CM, Cadmium finish  
No. L3379-DZ, Chromium finish



**Lockers with Gravity Type Locking Device**

*Dead bolt manually operated*

*Dial Operated Only*

No. L3368-CM, Cadmium finish  
No. L3368-DZ, Chromium finish

*Emergency Key Controlled*

No. L3378-CM, Cadmium finish  
No. L3378-DZ, Chromium finish

## NEW YALE COMBINATION PADLOCKS

**Strong construction** Rustless metal case, cadmium-plated steel shackle. **Easy operation.** Dialling three numbers and turning knob to right causes shackle

to jump open automatically. Pushing the shackle in automatically deadlocks the bolt and automatically disperses the combination.

### FOR BASKET LOCKERS AND ALL OTHER TYPES AND MAKES OF STEEL LOCKERS

*With Emergency Control Key*

**589 Combination Padlock**—Emergency Control Key operates all locks in set.  $\frac{1}{4}$ " shackle. 20,000 combinations—more to order. **579 Combination Padlock** is same, without Emergency Control Key.

*Dial Operated Only*

**515 Combination Padlock**—Excellent quality at moderate cost.  $\frac{1}{2}$ " steel shackle. 10,000 combinations—more to special order.





# ALL-STEEL EQUIPMENT INC.

41 Griffith Ave., Aurora Ill.



ENGINEERING AND SALES SERVICE IN ALL MAJOR CITIES  
**LOCKERS TO MEET EVERY NEED...**



**SINGLE TIER LOCKERS**

A-S-E Single Tier Lockers, are built in many styles and fitted with a variety of equipment. They are best for school corridors, team rooms, and wherever it is desirable for clothing to hang full length. Standard equipment consists of a hat shelf, two-prong ceiling hook, and three or more single prong hooks.



**DOUBLE TIER LOCKERS**

A-S-E Double Tier Lockers are of the same general construction as the single tier type. Interior equipment includes three single-prong coat hooks. No hat shelf or ceiling hook furnished unless specially ordered.



**TWO-PERSON LOCKERS**

In the modernized A-S-E two-person locker, each occupant is assigned to a combination of one coat compartment and one box locker. The user thus has one compartment for hat, books, etc., and the other for long garments. Opening the large door automatically unlocks one small door above. Locking and unlocking are automatic, simply by operation of the large doors. An exclusive A-S-E feature. (No leg lockers shown.)



**BOX LOCKERS**

In gymnasiums and class-rooms, one appearing A-S-E Lockers of the box or compartment type offer storage for shoes, lunches, books, and any number of small articles. Heights of this type of locker are made to conform to the 60" or 72" standard locker height.

A-S-E Lockers have a 39-year proven record of durability and economy in hundreds of schools. A-S-E's "know-how" in locker construction has resulted in a locker that minimizes maintenance costs.

They're reinforced at all points where abuse and wear might occur.

A-S-E manufactures a complete locker line—designed to meet all the requirements of every user.

## BASKETS AND RACKS

Economy in installation, complete ventilation, and visibility for inspection are obtained by using baskets and racks. A-S-E racks can be furnished in single row or double row, with or without casters.

## LOCKER BENCHES

Gymnasium locker rooms usually require benches, which are often purchased with the locker equipment. A-S-E benches consist of wood top, carefully sanded and finished, with rounded corners and strong iron pedestals.

## STYLES AND SIZES OF LOCKERS

### STANDARD SIZES IN INCHES

#### TYPE NO. 9000 — SINGLE-TIER LOCKERS

WIDE	DEEP	HIGH
12	12	60
12	15	60
12	18	60
15	15	60
15	18	60
12	15	72
12	18	72
15	15	72
15	18	72
18	18	72
18	21	72

Heights do not include 6" legs, which are standard equipment.

#### TYPE NO. 9001 — DOUBLE-TIER LOCKERS

WIDE	DEEP	HIGH
12	12	30
12	12	36
12	15	36
12	18	36
15	15	36
12	12	42
12	15	42
15	15	42

Height is for each locker opening. Overall height is twice this plus 6" for legs (standard equipment).

#### TWO-PERSON LOCKERS

COMPARTMENTS	WIDE	DEEP	HIGH
2 large	7½	15	53
2 small	15	15	9
Overall size	15	15	72
2 large	7½	18	53
2 small	15	18	9
Overall size	15	18	72
2 large	7½	21	53
2 small	15	21	9
Overall size	15	21	72

Heights cover no-leg lockers as illustrated.

#### TYPE NO. 9002 — MULTIPLE-TIER LOCKERS

WIDE	DEEP	HIGH	TIER	WIDE	DEEP	HIGH	TIER
12	12	12	5 or 6	9	12	20	3
12	15	12	5 or 6	9	12	24	3
15	15	12	5 or 6	12	12	24	3
15	15	15	4	..	..	..	..

Coat hooks in box lockers over 18" in height only.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

## PUPIL'S UNIT

## WALL-ROBES

## TEACHER'S UNIT



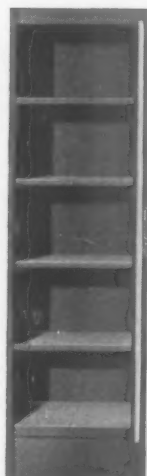
No. 9111, for four pupils. 22" wide, 15" deep, and 60" or 66" high including 6" legs. Has four 11" x 7" book compartments, four full-length coat compartments, two or three double-prong side hooks. Two doors. Furnished with ventilating system if specified on order.



No. 9112. For four to six pupils. 22" wide, 15" deep, 60" or 66" high including 6" legs. Four 11" x 7" or 15" x 7" book compartments, two full-length coat compartments, two or three double-prong side hooks in each compartment. Furnished with ventilating system if specified.



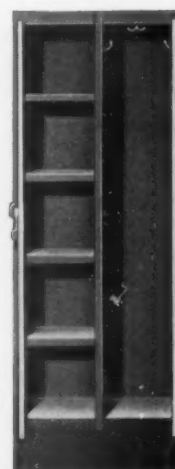
No. 9211. For four to six pupils. 22" wide, 15" deep, 60" or 66" high including 6" legs. Four 11" x 7" or 15" x 7" book compartments, two full-length coat compartments with coat rods and sliding coat hooks. (Four hooks in 22" width, six in 30".) Ventilating system optional.



No. 9313. Book case. 9", 12", 15", 18" wide, 15" deep and 60" or 66" high including 6" legs. Four full size shelves adjustable on 1 1/2" centers without use of tools. Can be used in combination with Unit No. 9312. Single door. Offered with ventilation system if specified.



No. 9312. Teacher's wardrobe. 9", 12", 15" or 18" wide, 15" deep, 60" or 66" high including 6" legs. Full length coat compartment and one full width shelf. One double-prong ceiling and two double-prong side hooks. Single door. Ventilation system if specified on order.



No. 9311. Teacher's combination unit. 22" wide, 15" deep, 60" or 66" high including 6" legs. Has full length coat compartment with one double-prong ceiling and two double-prong side hooks, four adjustable half shelves. Double doors. Ventilating system optional.

The problem of providing suitable accommodations for the clothing and personal articles of elementary school children, cannot be satisfactorily met by the usual types of lockers. The question of height must be considered, as well as the inability of young children to remember lock combinations or to avoid losing locker keys. A-S-E Wall Robes answer these problems — and more!

Their size and interior equipment are designed for use by small children. Installed in a side or a back wall of a classroom, they accommodate as many as forty pupils

and are always under the supervision of the teacher. One master lock locks up to five units simultaneously. Since the units have no individual locks, troubles with keys and combinations are not encountered. But in addition, A-S-E Wall-Robes save on building costs — they can be fitted successfully into any ventilating system — their appearance is excellent — the operation of doors is quiet and easy — and Wall-Robes will last a lifetime!

## LOCKER SPECIFICATIONS

**GENERAL.** A-S-E Lockers are made from hot-rolled annealed, stretcher-levoted steel, free from buckles or scale. They are built on the unit principle, with all parts interchangeable.

**FRAME.** 3/4 x 3/4 x 1/2" hard steel angle uprights; cross members 16-gauge (.060") cold rolled steel channel, inset at ends to be flush with face of angle uprights. Each corner riveted with two countersunk (flush) rivets, then ground and polished smooth on face of frame. No notches cut in angles for hinges.

**DOORS.** One piece 16-gauge (.060") hot rolled annealed steel, with 1" flange on all edges, and with additional 3/4" return flange (channel formation) on hinge side. Additional 3/4" and 3/8" return flanges (box formation) on latch side. Latch bar partially enclosed within box formation. Doors 18" or more in width reinforced by steel panel between sets of louvers.

**HINGES.** Flush hinges, completely concealed pin type, embossed in metal of door, making the door an integral part of the hinge. Hinge pin is held by a full looped hinge leaf of 16-gauge steel, riveted to frame by two countersunk (flush) rivets, ground and polished smooth on face of frame. Pin is held in the emboss in door by a heavy embossed hinge clip. Non-sagging and tamper proof. Two hinges on all sizes up to 42" high. Three hinges on 60" high, and 4 hinges on all lockers 72" in height.

**LATCH (Pre-locking).** Secure and silent. For either built-in locks or padlocks. Latch bar is raised to permit opening the locker, and immediately drops to "locked" position. Locker may be locked while in open position and, in closing, an independent latch engages the door jamb at each locking point.

**RUBBER SILENCERS.** Live rubber silencing equipment furnished on all single and double tier lockers, at points of contact on top and bottom of latch bar and on door jams.

**HANDLE.** White brass, die-cast, in distinctive design, shaped for easiest natural grip and greatest safety. Chromium plated in high-lighted satin finish, or nickel-plated, Butler finish. Padlock attachment and padlock guard (to prevent padlock from striking against door and marring finish) are integral parts of handle. Padlock eye completely enclosed within handle. Handle is attached to latch bar with two special slotless head machine screws and lock washers.

**VENTILATION.** Standard ventilation feature consists of louver perforation of harmonious modern design. Single tier lockers have sets of eight louvers at top and at bottom of door. Double tier type have sets of four at top and bottom. Louver perforations full height of door, or 1/2" round hole perforations on 1 1/2" centers, on order.

**NUMBER PLATE.** Highly polished, with large black filed numbers, attached with two solid rivets. Numbering as specified.

**BACKS.** 24-gauge (.024") hot rolled annealed steel. Flanged on upright edges to fit around sides of lockers. Bolted to sides on 12" centers.

**SIDES.** 24-gauge (.024") hot rolled annealed steel. Offset at front and back to fit inside of frame angle and back flange. Top edges flanged to fit over edges of locker top. Assembled to back and locker frame with bolts on 12" centers.

**TOPS.** 24-gauge (.024") hot rolled annealed steel. Flanged on all four sides, and attached with bolts to sides and back of locker. Front of top formed to fit inside of and rest on top cross channel of frame. Top flush with top of frame.

**BOTTOMS.** 24-gauge (.024") hot rolled annealed steel. Flanged on all four sides. Attached with bolts to locker sides and backs. Fronts formed to fit inside of the rest on bottom frame member. Bottom flush with frame.

**SHELVES.** 24-gauge (.024") hot rolled annealed steel. Flanged on sides and back, with rolled edge at front for

greater strength and smoothness. Attached with bolts in each side at a point approximately 9" from top in single tier lockers. Not furnished in double tier unless specially ordered.

**BOLTS.** All bolts used in A-S-E lockers are 8/32 slotless binding head machine screws, black Parkerized. Nuts used are square, also black Parkerized.

**HOOKS.** Heavy ball-point, cadmium plated against rusting. Single-prong side hooks and double-prong ceiling hook in single-tier lockers, in other styles on special order. All hooks attached with two bolts.

**STANDARD EQUIPMENT.** Number plate, padlock attachment, three coat hooks (more in larger size), hat shelf, and two-prong ceiling hook in single-tier locker. Double-tier lockers have same equipment, but no hat shelf or ceiling hook unless specially ordered. All lockers 18" or more in depth have coat hanger rod instead of ceiling hook. 6" legs are standard equipment and adjustable feet are furnished when requested. No leg lockers (for recessed or concrete base installation) furnished at same prices as standard lockers. Closed base, sloping hood, and other special features supplied at nominal extra cost.

**FINISHING TRIM.** For recessed installations. 18-gauge (.048") cold rolled steel. 3" standard width. Built to length of locker rows and height of lockers, with nearest overlapping slip joint for adjustment to length. No bolt or rivet heads showing.

**LOCKS.** Any standard type of locker lock or padlock can be furnished on order.

**FINISH.** A-S-E olive green or dawn gray, standard colors. Other colors on order. All parts thoroughly cleaned, then enameled and baked at high temperatures. All locker fronts further finished in hand sprayed lacquer. Highest quality enamels and lacquers used.

**SHIPMENT.** Shipped completely assembled or knocked-down. Doors are always shipped assembled to frames as one front.



ALL-STEEL EQUIPMENT INC.

41 GRIFFITH AVE.

AURORA, ILL.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# AURORA STEEL PRODUCTS COMPANY

ESTABLISHED 1915

153 Third Street, Aurora, Illinois

TELEPHONE: AURORA 2-7696

## STEEL LOCKERS FOR *Every* SCHOOL NEED

### SINGLE TIER LOCKERS



Flat or Slope Top . . . Heavy gauge cold rolled steel construction throughout. No. 16 gauge doors and No. 24 gauge body. Completely ventilated by louvers in top and bottom of doors. 3 heavy 5 knuckle theft-proof semi-concealed hinges make it impossible to remove pin and get in locker. Free standing or recessed type. Each locker includes hatshelf and 3 single prong coat hooks. Available from 12" to 18" wide, 60" or 72" high, 12" to 21" deep.

### BOX LOCKERS



Ideal for combination with single tier lockers. Heavy gauge metals for maximum strength. Expert workmanship throughout. A perfect locker for use in gyms, art and science classrooms where space is at a minimum. Special colors available—12", 15" or 18" wide, 12" or 18" high, 12", 15" or 18" deep. Lockers are manufactured in sections 5 and 6 high.

### DOUBLE TIER LOCKERS

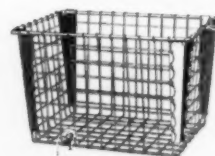


Maximum compactness with plenty of room for coat and book storage. Same quality construction and workmanship as in Single Tier Lockers—Double Louvers—for complete ventilation. 2 heavy gauge 5 knuckle semi-concealed hinges. Olive green finish. Special colors available. 12", 15" or 18" wide, 12", 15" or 18" deep. Height 30", 36" and 42". All doors have padlock attachment.



### LOCKER BENCHES

Heavy cast iron pedestals finished in olive green or black baked enamel. Bases have proper size flange and may be anchored to floor. Pedestals 16½" high, spaced 5 ft. apart. Sanded pine or birch benches highly finished with shellac and varnish. 9½" wide, 1½" thick—lengths to specifications.



### BASKET RACKS AND BASKETS

Manufactured from finest steel. Angle iron frames and steel cross braces prevent "Sway". Metal dividers keep baskets in proper alignment. Shelves and baskets come with number plates attached, as specified—truly an investment in quality.

FLAT KEY, COMBINATION OR PADLOCK, AVAILABLE AT EXTRA COST

WRITE TO-DAY FOR CATALOG AND QUOTATIONS ON YOUR NEEDS

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51





# BERGER MANUFACTURING DIVISION

REPUBLIC STEEL CORPORATION

Canton 5, Ohio

OFFICES IN PRINCIPAL CITIES: Baltimore • Birmingham • Boston • Buffalo • Charlotte, N. C. • Chicago • Cincinnati • Cleveland • Columbus • Dallas • Denver • Detroit • Indianapolis • Kansas City • Long Island City • Los Angeles • Milwaukee • Minneapolis • New Orleans • Oakland • Philadelphia • Pittsburgh • Portland • Salt Lake City • St. Louis

EXPORT DEPT: New York, N. Y.



**BERGER STEEL FILING CABINETS (above)**  
5, 4, 3 and 2-drawer models accommodate all papers, records and books in common use. Case and drawer members are high-quality steel, electrically welded to rigid, one-piece construction. They will stand exceptionally hard usage and give year of satisfaction. Interchangeable drawers roll easily on ball-bearing slides. Rubber bumpers deaden sound. New STA-LOCK compressors are positive locking. Standard baked-enamel finishes are neutral green, rich walnut and mahogany grains, and modern platinum gray. Write for detailed catalog.

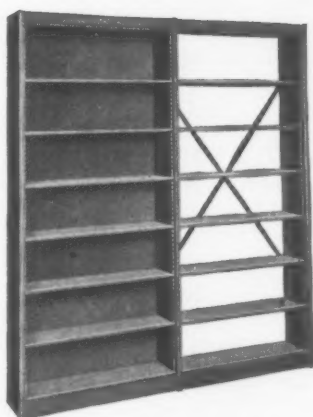


**BERGER STEEL LOCKERS (above)**  
Scientifically constructed of heavy-gauge steel to withstand a lifetime of hard usage with little depreciation. Standard finishes are neutral green, gray and beige. Type SS illustrated is the world's most popular general purpose model. It can be used free-standing or recessed in corridor walls. Many other styles and models to choose from. Write for catalogs.

**BERGER FLEXI-BILT UNITS (right)**  
Invaluable for storing and protecting hundreds of small items, yet keeping them instantly available. They are individual steel units with indexed, easily adjustable small bins of varying sizes. Many bin combinations are possible, tailored to fit your every need. Write for detailed information.



**BERGER DESKS AND TABLES (left)**  
The latest in school office furniture. Completely new in design and features. New sight-saving top eliminates glare, is easy on the eyes. New, more comfortable 29" height—adjustable to 30 1/2". Interchangeable tops, pedestals and drawers. Built on 15" modular principle, desk illustrated has easy-to-reach 60" x 30" top. Conference top with 9" overhang on ends and rear is available. Berger Tables are perfect matching companion units. Write for literature.



**BERGER STEEL BOOK SHELF UNITS (above)**  
Sturdy bolted construction, 84" high for general library use, 90" high for law libraries. Six plain steel shelves fit slotted uprights, are easily adjustable on 1" centers and are designed to prevent accidental removal. No obstructions to removal of end books. Furnished with backs or sway braces, with or without end panels.



**BERGER STEEL STORAGE, WARDROBE AND COMBINATION CABINETS (above)**  
Are large and roomy, serve an unlimited number of uses. Strongly constructed of heavy steel, properly reinforced. Baked enamel finishes are platinum gray, olive green, grained walnut and mahogany. Double-Door Storage Cabinet illustrated has four adjustable shelves, three-point locking mechanism.



**BERGER STEEL SHELVING (right)**  
Offered in many combinations to fit any storage problem. Complete information on request.



# INTERIOR STEEL EQUIPMENT CO.

2351 East 69th Street, Cleveland 4, Ohio

## A COMPLETE LINE

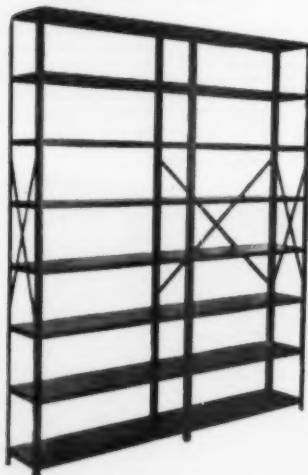
- Steel Lockers
- Book Cases
- Shelving
- Filing Cabinets
- Storage Cabinets
- Drafting Tables
- Key Cabinets
- Herbarium Cases
- Work Benches
- Transfer Cases
- Wire Baskets
- Steel Specialties



LOCKERS



HERBARIUM CASES



SHELVING AND BASKET RACKS

*Interior Steel* Lockers can be had in a variety of styles and sizes. They are made in accordance with Federal specifications No. AA-L-486. Our catalog will give you the complete line which will meet your needs.

*Interior Steel* Library Units put to work every inch of storage space with one inch adjustment of shelves. This makes easy and quick rearrangement to meet your current needs.

*Interior Steel* Herbarium Cases offer complete protection for safe storage of specimens from the destructive influence of vermin, dust and air. These cases have been used in many leading museums and universities.

*Interior Steel* 1100 Line Storage Cabinet. A complete line which would be an asset to any room or office, available in a variety of sizes and styles. Write for your catalog.



### *Interior Steel*

WB Bench Lockers are designed for use in industrial art shops of vocational schools.

They conserve floor space and provide ample space for tools and supplies. They can be had in a variety of sizes, with a hard wood working surface.

*Interior Steel* Shelving and Basket Racks are built up from simple standard, quickly assembled parts, and it is possible to obtain hundreds of different combinations of unit styles and sizes, so as to meet your requirements. Write for our catalog.

*Interior Steel* Drafting Tables. Can be used for a variety of drawing classes. The table has a smooth steel top with an adjustable hinged section, flanged at bottom to hold drafting board. Individual locked drawers for six students.



LIBRARY INSTALLATIONS



STORAGE CABINETS



DRAFTING TABLE

—FOR STEEL EQUIPMENT SEE "*Interior Steel*"—  
CATALOGS ARE AVAILABLE UPON REQUEST

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# STANDARD STEEL EQUIPMENT CO., INC.

Dept. A-4, 117-20 Fourteenth Road, College Point, L. I., N. Y.

## QUICK RELIEF FOR STORAGE HEADACHES

### COMBINATION CABINET

Designed for wardrobe and storage duty in offices, factories, homes. One full shelf, 3 adjustable half shelves, generous space for clothes. 72" x 36" x 18".

Style 3CW



Style 1WA

### WARDROBE CABINET

Fifteen to twenty garments will hang in this impressive steel wardrobe. Measures 72" x 36" x 18". Shelf for hats, 2 wide-opening doors.

Either of these cabinets may be changed into the other with inexpensive parts which you may order.

### STORAGE CABINET

72" x 36" x 18", has 4 adjustable shelves. An efficient automatic house-keeper for office stationery, forms, equipment. Extra shelves available.

Style 4ST



All STANSTEEL Equipment is constructed of rugged, extra-heavy gauge steel, with olive-green enamel finish baked on for long life and handsome appearance! All cabinets have special 3-way locking mechanism and are equipped with Chrome Handles and Yale Locks and Keys. (2-door Cabinets have 2 Chrome Handles). Extra shelves available on all cabinets. STANSTEEL Equipment is quick and easy to assemble, with bolts, nuts and other assembly fittings supplied. Simple instruction sheets are enclosed in each carton.

### DESK HIGH CABINET

The answer for overcrowded desks. Lots of storage space inside, working space on top. 29" x 20" x 18", one shelf.



Style 1DC

### COUNTER HIGH CABINET

Two adjustable shelves in this low-priced 42" x 36" x 18" steel cabinet. Counter surface more than 4 sq. ft. Style 2CH



**IMMEDIATE DELIVERY!**  
Write or phone today for low prices on the job-tested storage helps you require.



### STEEL LOCKERS

#### ALL SIZES

Double tier and Multiple tier also available. Single tier in single units or 2 or more wide. Pad-lock attachment or built-in lock.



### STEEL SHELVING

#### Made to Your Specifications

Stansteel shelving is made in every conceivable type of shelving. Let us know your requirements.



### UTILITY SHELVING

Makes one unit or two, as illustrated, simple to assemble, quick to rearrange. Fits thousands of needs everywhere. "MAGIC ANGLE" corner brackets make shelves and uprights super strong.

Style 15U — 67" x 36" x 12"

Style 25U — 67" x 36" x 13"

Style 35U — 67" x 36" x 18"



### Slim Jim UTILITY CABINET

Wardrobe Style 24WA; Storage Style 24ST

Ideal for narrow spaces, measures 72" x 24" x 18". There's 10 feet of shelf space in 24ST, or plenty of room for clothes in 24WA. Both styles easily interchangeable.

### PARTS BINS

To Your Specifications AT NO EXTRA COST  
Fill your requirements EXACTLY! Basic Units are 87" x 36" x 12". When your needs change, your bins change. Shelves, sloping dividers, square dividers, bin fronts, drawers, all interchangeable. Additional units always available at low cost. Let us know your needs.



Style 18SP

### SMALL PARTS CABINETS

13" x 36" x 12" with 18 generous drawers. Every drawer and drawer-divisor (2 to a drawer) has its own individual label holder. Ideal for small parts needed close at hand!

These Storage Helps are **JOB-TESTED!**  
Your guarantee of satisfactory service is **JOB-TESTING**. Job-tested equipment is sold on one basis alone: the equipment must deliver as required, or it won't be recommended. All storage helps illustrated here are job-tested. We take pride in offering and recommending this money-saving, space-saving, work-saving equipment.

**STANDARD STEEL EQUIPMENT CO., inc.**

Write Dept. A-4 for Catalogue or see Sweets Catalogue



# LYON METAL PRODUCTS, INCORPORATED

General Offices: 1334 Madison Avenue, Aurora, Ill.

Factories: AURORA, ILL., YORK, PA., CHICAGO HEIGHTS, ILL.

Sold Nationally through Factory Branches and Dealers

## LYON STEEL EQUIPMENT

### FULL LINE OF LOCKERS



**NEW ELEMENTARY SCHOOL LOCKER  
AND TEACHERS STORAGE LOCKER**

Low - cost - per - pupil (approximately \$6.00 F.O.B. Factory)—stands 48" high plus 6" for legs. Accommodates 4 children with space for hats, clothes and overshoes. Doors louvered—back punched for ventilation. Doors open maximum of 90°—prevents contact with adjacent lockers. Green or non-glare gray finish. Teachers storage locker (left) has 3 permanent shelves—excellent for storing class room supplies.



**SINGLE TIER LOCKERS**

Most practical and widely used of all lockers. Recessed handles. Full length clothing storage. Shelf at top for hats, lunches, etc. Available in sizes from 12" x 12" x 60" to 18" x 21" x 72". Green or non-glare gray finish.



**DOUBLE TIER LOCKERS**

Economy in cost and space. Excellent for short period occupancy or where long coats are not worn. Available in sizes from 12" x 12" x 36" to 12" x 15" x 42" (per locker door opening). Green or non-glare gray finish.

### KITCHEN CABINETS AND SINK UNITS

Beautiful steel kitchen cabinets and sinks are ideal for home economic classes and cafeteria kitchens. White baked-on enamel finish is easy to keep clean. Lyon kitchens are flexible enough to allow a "tailored fit" to any working arrangement desired. Tap-O-Matic handles—tap the handle and the door opens. Insulated for silent operation. All Lyon cabinets carry the Kitchen Cabinet Institute Seal of Approval.



THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

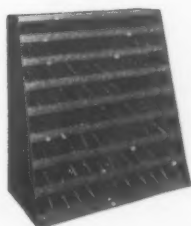
# LYON STEEL EQUIPMENT

## VOCATIONAL EQUIPMENT



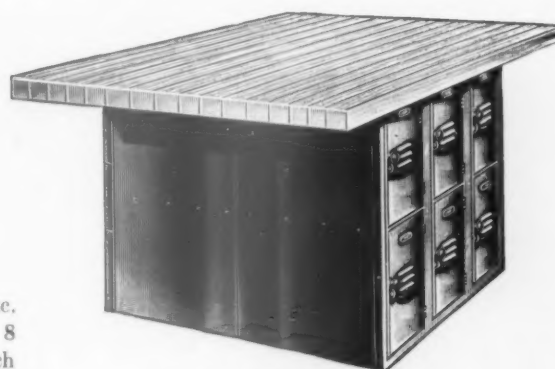
### DRAWING TABLE

Table has smooth steel top. Flange to hold drawing board in place. Slope of top adjustable every inch. Available with lock-up compartments for class room use. Table top 45½" wide, 26" deep. Green baked-on enamel finish.



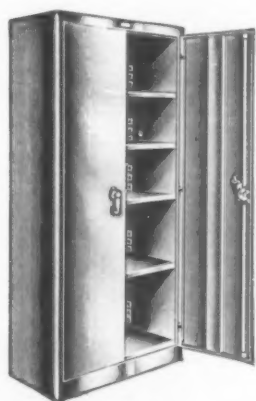
### TOOL CRIB UNIT

For storage of drills, tools, etc. Has 108 compartments on 8 shelves. Label holders on each shelf. Shelf edges turned up to form bin fronts. Shelf dividers adjustable every inch. 34¼" wide, 17½" deep, 37¾" high. Green baked-on enamel finish. This unit is just one of a complete set of storage units available for tool inserts.



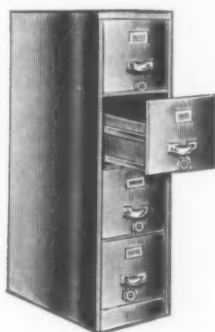
### WOODWORKING BENCHES

These benches offer a work surface and systematic storage of tools and work projects for either 6 or 12 pupils. Top is 1¾" thick hard maple or birch with natural finish. Double face model (illustrated) has working space for 4, storage for 12. Available in single face model for use against wall—working space for 2, storage for 6.



### STORAGE CABINETS

Storage cabinets for school or office supplies have 4 shelves which are adjustable every 2" without tools. Extra shelves may be added if required. 36" wide, 21" deep, 78" high. Lyon green baked-on enamel finish.



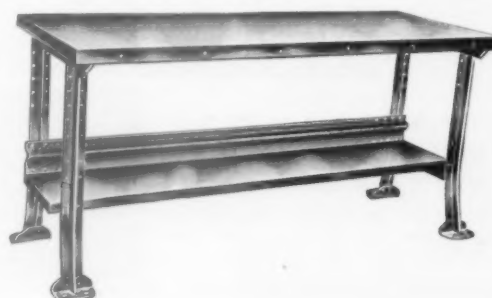
### FILING CABINETS

Available in suspension or non-suspension types and with 2, 3 and 4 drawers. Legal size (17½" wide—28" deep), or letter size (14¾" wide—28" deep). In green baked-on enamel finish.



### STEEL STOOLS

Lyon stools are available in 5 heights and 80 models. Basic stool has steel seat and steel glide feet. All sizes may be equipped with accessories—backs, pressed wood seats, casters, rubber feet. All accessories are interchangeable and may be attached or removed at any time. Green baked-on enamel finish.



### WORK BENCHES

Steel top work benches are suitable for every type of heavy duty bench work. Also available with pressed wood or wood (Kiln dried maple or birch) tops. All benches are 34" high—28" or 34" deep—and 60", 72" or 120" (steel top only) long.

# FRED MEDART PRODUCTS, INC.

3550 DeKalb St. St. Louis 18, Missouri

SALES ENGINEERS IN ALL PRINCIPAL CITIES

## MEDART STEEL LOCKERS

*"The Standard of Comparison" . . .*

Available in large range of sizes and specifications for schools, gymnasiums, hospitals, industrial plants, etc. Shown are a few of the standard styles. Can be furnished in any grouping, either recessed or free-standing type (with legs or base). Standard finishes, Desert Sand and Olive Green. Special col-

ors can be supplied. All lockers have individual flat tops. Interior equipment may include shelf, coat rod and hooks; optional equipment, cabinet base, extra shelves, sloping tops, wide range of built-in locks or padlocks. For complete details, write for Catalog L-8.



### DOUBLE-TIER LOCKERS

When economy is the watchword, ideal for the gym locker room where clothing is stored only short periods of time. Construction is primarily the same as the single-tier type.

Available 12" or 15" wide; 12", 15" and 18" deep; and 30", 36" or 42" high.

### GYM SUIT LOCKERS

Safe, compact, well ventilated gym paraphernalia storage compartments. Available 3 or 4 tiers to match height of either 60" or 72" single-tier dressing lockers. Box locker construction, minimum standard width is 9". Space saving, yet with a sufficient door opening.

Available 3 or 4 tiers; 9" or 12" (3 tier, 24" high only) wide; 12" deep; 18", 20" or 24" high.

### BOX LOCKERS

Recommended when storage space is limited, or required, and where more security is needed than wire baskets afford. Particularly useful for storage of small articles in gym dressing rooms, class rooms, bowling alleys, etc.

Available 4, 5 or 6 tiers; 12" or 15" wide; 12" or 15" deep; 12" or 15" (4 tiers only) high.

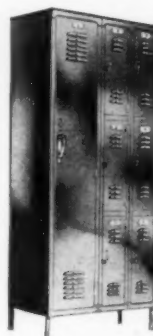
### SINGLE-TIER LOCKERS

Most popular for general use in High Schools, Colleges, Universities and other institutions. There is a Medart Single-tier locker of a size to fill your particular needs.

Available from 9" to 18" wide; 12" to 21" deep; and 60" or 72" high.

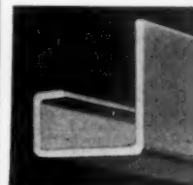
### MEDART WIRE BASKET SHELVING

Wire Basket Shelving and Wire baskets for use where the privacy of Steel Lockers is not required. Write for descriptive literature.



### FEATURES

**Door Latching**—Pre-locking and self-latching, only Medart Lockers have the tamper and pick-proof patented "dual-latch" door mechanism.



**Channel Frame**—Electrically welded solid square frame, 15 ga. steel up-rights and 16 ga. cross members, formed channel shape.

**Hinge**—Heavy, five-knuckle hinge of 14 ga. steel with semi-recessed 3/16" diameter pin. Welded and bolted to frame and door.

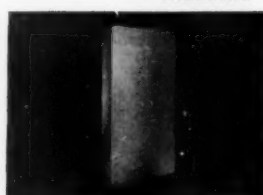


**Handle**—Lift type, chrome-plated, of non-breakable alloy. Padlock strike integral part of handle.

**Leg**—Heavy malleable iron adjustable front legs separately attached to door frame.



### MEDART STEEL CABINETS



Medart Steel Cabinets provide convenient and economical storage space for valuable supplies and clothing. Write for descriptive literature.

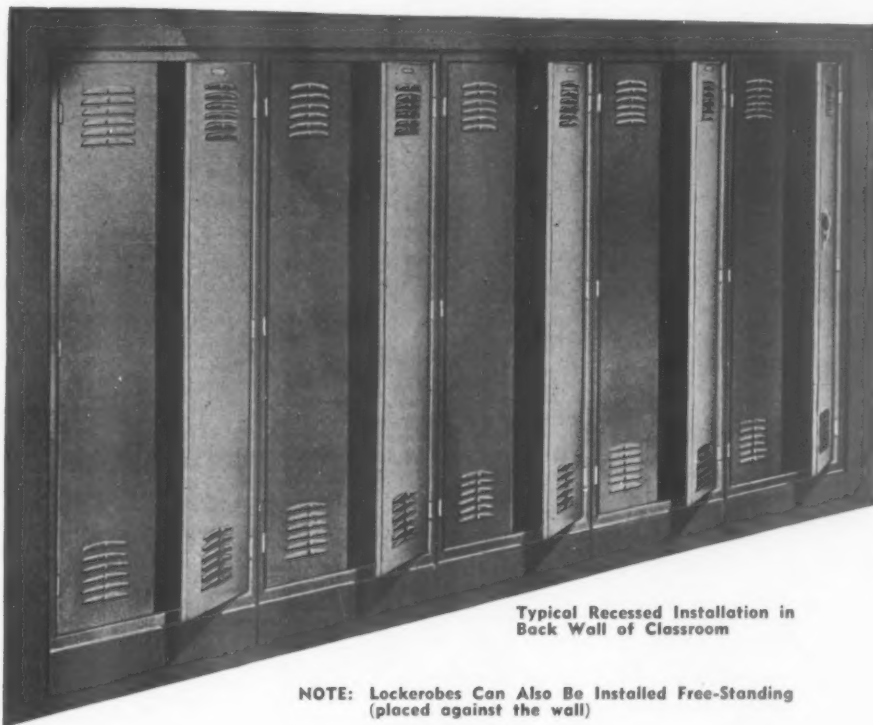


# MEDART STEEL LOCKEROBES

Safe, sanitary, fire-resisting and durable storage facilities for elementary schools. An assembly consists of a multiple of pupil units, each enclosed by a pair of doors. "Simultaneous Opening Master Door Control," an exclusive Medart feature, is endorsed by architects and school officials. All doors simultaneously opened and closed by one person.

Lockeroberes permit reducing cubic footage of schools . . . large savings in construction costs . . . less painting, plastering and general maintenance. Compare 16" recess depth with space-waste (and higher upkeep) of ordinary wardrobes or separate cloakrooms. May be installed in unfinished recesses, eliminating wall finishes, overhead framing, floors—and future maintenance costs! For complete details, write for Catalog LR-5.

**with Simultaneous Opening  
"Master Door Control"**



NOTE: Lockeroberes Can Also Be Installed Free-Standing (placed against the wall)

## Four advantages of "Master Door Control" . . .

### ● MINIMUM SUPERVISION

Operation of all doors controlled by one person, no delay in starting classes! Supervision required only at scheduled time—no waiting while half or entirely open doors are closed!

### ● PROMOTES ORDER

Compare quiet operation of "Simultaneous Opening Master Door Control" with noise of opening, closing or slamming of wardrobe doors by average class of 40 pupils!

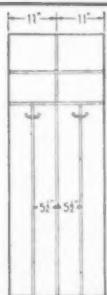
### ● NO INJURY HAZARD

Doors open on 90° angle with operating mechanism having safety device whereby right-hand doors cannot be moved until left-hand doors are closed! Possibility of accident removed by absence of many individually operated doors!

### ● NEAT APPEARANCE

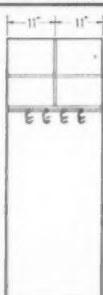
Doors are either open or closed, no unsightly half-open doors disturb trim, spic-and-span appearance of classroom!

## INTERIOR ARRANGEMENTS AVAILABLE



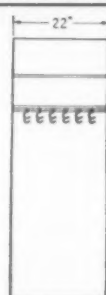
"A"

Accommodates 4 pupils. Provides individually partitioned hat and coat compartments, latter each containing 1-single prong coat hook.



"C"

Accommodates 4 pupils. Provides individual hat compartments, 4 sliding double prong coat hooks and coat rod.



"D"

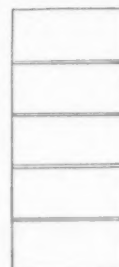
Accommodates 6 pupils. Provides 2 full-width shelves, coat rod, and 6 sliding double prong coat hooks.



"E"

Accommodates 5 pupils. Provides 2 full-width shelves, 2 rods and 4 self-adjusting partitions with single-prong coat hooks attached.

## AUXILIARY UNITS AVAILABLE



BOOKCASE

Equipped with 4 adjustable shelves.



TEACHER'S WARDROBE

Equipped with hat shelf, coat rod and 2 single prong coat hooks.



COMBINATION BC & TWR

Equipped with 2 single prong coat hooks and 4 adjustable shelves.

NOTE: Auxiliary Unit Doors operate and lock independently.

## MEDART STEEL GRADE-ROBES

Grade-Robes offer the same features, except for "Simultaneous Opening Master Door Control," as the Lockerobe, yet are priced for the low budget. If economy dictates that absolute one-person control of opening, closing and locking of doors be dispensed with, the modern Grade-Robe is the answer

for elementary school wardrobe equipment.

With "Individual Door Control," each pair of Grade-Robes doors is equipped with a separate, two-point, damage-proof, positive self-latching device; a handle on each right-hand door; and, as desired, with or without grooved key locks.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# PENN METAL CORPORATION OF PENNA.

48 Oregon Avenue, Philadelphia 48, Pa.

FOUNDED 1869



by L. Lewis Sagendorph

## A COMPLETE LINE OF STEEL LOCKERS, SHELVING and CABINETS



**SINGLE TIER LOCKER**  
TYPE 50-U-2

The most popular of all personal lockers. Holds complete clothing change, hanging full length. Has hat shelf and coat hooks.

### STANDARD SIZES

Width	Depth	Trade Height *
12"	12"	60 or 72"
12"	15"	60 or 72"
12"	18"	60 or 72"
15"	15"	60 or 72"
15"	18"	60 or 72"
18"	18"	60 or 72"
18"	21"	72"
24"	21"	72"



**DUAL TYPE LOCKER**  
TYPE 91

Same as Type 50-U-2 with addition of a center partition to separate soiled from clean clothing, for one occupant—or for 2-person occupancy. Coat rod in each compartment.

### STANDARD SIZES

Width	Depth	Trade Height *
15"	18"	60 or 72"
18"	18"	60 or 72"
18"	21"	72"
24"	21"	72"

\* For overall outside height, add 6" for legs. Add 1 9/16" for lockers without legs. Slope tops increase height by half of locker depth.

\*\* Trade height is single opening. For overall outside height, add 6" to total height of all openings, for legs. Add 1 9/16" for lockers without legs. Slope tops increase height by half of locker depth.



**DOUBLE TIER LOCKER**  
TYPE 50-U-2

Accommodates 2 persons, in private compartments with coat hooks, and individual doors.

### STANDARD SIZES

Width	Depth	Trade ** Height
12"	12"	36 or 42"
12"	15"	36 or 42"
12"	18"	36 or 42"
15"	15"	36 or 42"
15"	18"	36 or 42"

Triple Tier Lockers also available in variety of sizes, for gym use.

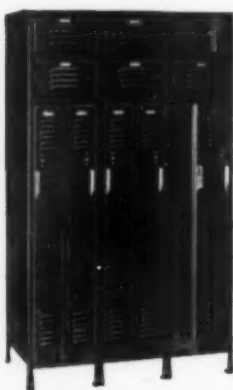


**BOX LOCKERS**  
TYPE 40

Can be arranged 3, 4, 5, or 6 lockers high and any number of units wide. Compartments lock individually. May be combined with other lockers for gym use.

### STANDARD SIZES

Width	Depth	Trade ** Height
12"	12"	12"
12"	15"	12"
12"	18"	12"
12"	15"	15"
15"	15"	15"
15"	18"	15"
15"	15"	18"
15"	18"	18"



**TWO-PERSON LOCKER**  
TYPE 734

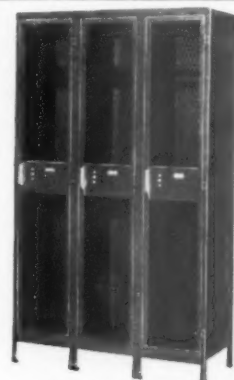
Provides private lockers for 2 persons in half the usual space. Individual, interlocking hat and coat compartments. Each locker is 15" wide, 21" deep, 72" trade height. Details on request.

## PENCO LOCKER ARRANGEMENTS FOR EVERY SCHOOL NEED

There's a Penco Steel Locker for every school and college use, quality-built to meet all requirements of U. S. Federal Specification AA-L-486. The standard types and sizes shown here fit into most plans as manufactured, and can be combined in various arrangements for the needs of individual schools—in corridor, gymnasium, and central locker room installations. Standard baked enamel colors are olive green, school brown and gray. Variety of locking arrangements, featuring Penco automatic locking.

## HOW TO SPECIFY STEEL LOCKERS

Lockers can be provided with or without legs, open or closed bases, flat or sloping tops, singly or in groups. When installed they can be free-standing on the floor, on cement, tile or other bases, or recessed in walls. (Recessing details on request.) Specify which of the foregoing optional features are desired; also quantity, type, size, grouping, numbering scheme, color, type of lock, and whether to ship assembled or knocked down. If possible, furnish floor plan and elevation.



**OPEN MESH DOORS**

Single and double tier lockers available with flat expanded metal, open mesh doors. Penco mesh has largest openings, provides maximum natural ventilation. Also permits visual inspection.

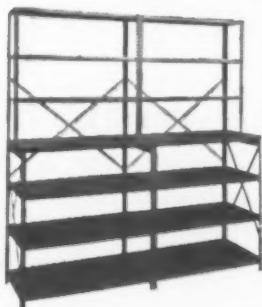
Locker Room Benches with cast iron pedestals also available. Details on request.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# SAVE MONEY BY SPECIFYING PENCO STANDARD STEEL SHELVING



OPEN TYPE  
PLAIN SHELVING



OPEN TYPE  
LEDGE SHELVING



CLOSED TYPE  
PLAIN SHELVING



CLOSED TYPE  
LEDGE SHELVING



CLOSED TYPE  
PLAIN SHELVING  
WITH DOORS



CLOSED TYPE  
LEDGE SHELVING  
WITH DOORS

School planners are saving as much as 30%, and more, on original classroom equipment costs, by installing *standard* Penco Shelving for textbook, notebook, supplies, and visual aids storage. The wide range of styles and stock sizes (over 200—meeting U. S. Federal Specs.), permits great design flexibility.

The basic, standard styles of Penco shelving are shown here. By combining different types and sizes in various quantities, you can meet nearly every storage need. In specifying, state type desired, number of units, size of each unit, and give floor plan and elevation to show arrangements. Additional parts may be added to basic units at any time to provide extra utility. Specify whether extra shelves are wanted, dividers, bin fronts, boxes, or label holders. If unusually heavy loads are to be carried, also advise approximate weight. Standard baked enamel colors are olive green, school brown and gray.

STANDARD SIZES—PLAIN SHELVING (any combination of width, depth, height)		
Widths	Depths	Heights
24", 30", 36", 42", 48"	12", 15", 18", 24", 30", 36"	3' 3" to 10' 3" in multiples of 12"

STANDARD SIZES—LEDGE SHELVING (any combination of width, depth, height)		
Widths	Depths	
	Above	Below
24", 30", 36", 42", 48"	9", 12", 15", 18", 24"	15", 18", 24", 30", 36"
		4' 3" to 8' 3" in multiples of 12" Ledge height 3' 3"



MODERN CLASSROOM WITH RECESSED PENCO SHELVING

## NEW UNIVERSITY CORRIDOR LOCKER INSTALLATION



## PENCO STEEL STORAGE AND WARDROBE CABINETS

Eight types available for office wardrobes and supplies storage. Single and double door, four basic sizes — 24 x 18 x 78", 24 x 24 x 78", 36 x 18 x 78", 36 x 24 x 78". Also desk-high, counter-high and tool cabinets—all meeting U. S. Federal Specs. For office and teachers' room use. Can be free-standing or recessed in walls.



YOU CAN SPECIFY PENCO PRODUCTS WITH CONFIDENCE — WRITE FOR SCHOOL EQUIPMENT FOLDER SE-3

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



## ELECTRIC-AIRE ENGINEERING CORP.

209 W. Jackson Boulevard, Chicago 6, Illinois

Manufacturers and Distributors of Quality Hand and Hair Dryers



**STUDENTS  
WELCOME  
THIS  
SERVICE**

### ELECTRIC-AIRE HAIR DRYERS

Dries hair thoroughly in **THREE** minutes  
Speeds up locker room traffic  
Greatly reduces danger of colds  
Engineered for hard, continuous service

#### MANUFACTURED IN FOUR TYPES OF SWITCH OPERATION

- No. 1** Remote control for battery operation thru master switch. Ideal for speedy handling large groups or classes.
- No. 2** Individual manually operated switch and rheostat control provides variable air temperature. Especially designed for dormitory use, clubs and the home.
- No. 3** Automatic cut-off time switch control. Recommended for high schools, colleges, university dressing rooms and public pools.
- No. 4** Coin operated switch—five minutes for five cents. **FULLY AUTOMATIC.** Self liquidating. Excellent for dormitories, sorority and fraternity houses.

### ELECTRIC-AIRE HAND DRYERS Built For Hard Service

- Insures clean attractive washrooms
- Provides an all day, uninterrupted service
- Eliminates paper towel clogged toilets
- Removes a dangerous paper towel fire hazard
- Dries thoroughly — **PREVENTS CHAPPED HANDS** — healthful and sanitary
- Saves 85%, or more, over towel costs — plus expense of buying, storing, and disposing
- Easy to install and service — will last a life time



Do Your Wash-rooms Look Like  
← **THIS?**

Then Why Not  
↓ **Convert to THIS?**



#### A few Schools now using ELECTRIC-AIRE DRYERS

University of California at Berkeley  
Board of Education, New York City  
San Mateo Union High School, Calif.  
Pius High School, Milwaukee, Wis.  
St. Boniface Parish, Chicago, Ill.  
Indiana University, Bloomington, Ind.  
George Peabody College, Nashville, Tenn.  
Board of Education, Cincinnati, Ohio

**ELECTRIC-AIRE HAND AND HAIR DRYERS APPROVED BY UNDERWRITERS LABORATORIES, INC. carry a TWO year replacement guarantee against possible defective parts.**

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# MATHIESON CHEMICAL CORPORATION

Mathieson Building, Baltimore 3, Md.

## BRANCH OFFICES

Charlotte 2, N. C., Liberty Life Bldg.  
Chicago 11, Ill., 410 N. Michigan Ave.  
Cincinnati 2, Ohio, Dixie Terminal Bldg.  
Houston 2, Tex., Gulf Bldg.

New Orleans 12, La., Queen and Crescent Bldg.  
New York 17, N. Y., 60 E. 42nd St.  
Philadelphia 7, Pa., Widener Bldg.  
Providence 3, R. I., Hospital Trust Bldg.

St. Louis 2, Mo., Rialto Bldg.

## PRODUCTS

Sanitation H T H (Concentrated Hypochlorite)	Aqua Ammonia—26°
H T H Bleach	PH-Plus (Fused Alkali)
H T H-15 (Germicide)	Super-Mafos (Dishwashing Cleanser)
Lo-Bax (Bactericide)	Anhydrous Ammonia

## SANITATION H T H



Positive sanitation is of prime and constant importance to schools and universities everywhere—particularly in connection with swimming pools, gymnasiums and locker rooms. For such a wide variety of sanitary requirements, Sanitation H T H is a convenient and reliable source of chlorine. A dry, free-flowing, readily soluble product, Sanitation

H T H contains 70% available chlorine and will retain that strength through long periods of storage. The convenient, easy-to-handle 5-lb. cans of Sanitation H T H are packed nine to the case.

### For Swimming Pools

For the continuous or periodic chlorination of swimming pool water, Sanitation H T H offers the advantages of dependability, simplicity and low first-cost of chlorinating equipment.

Hypo-chlorinating equipment is available for continuous disinfection of pools of every size with H T H solutions, offering accurate dosage and substantial economy in operation. For supplementary use during emergencies and peak loads, Sanitation H T H has been accepted and is stocked by hundreds of swimming pools throughout the country.

In addition to keeping the pool water safe, Sanitation H T H is recommended for use in a coordinated, entrance-to-exit sanitation routine to keep locker rooms, toilets, runways and other pool surroundings safe and sanitary. A valuable 48-page manual, "Keeping the Pool Safe and Sanitary," is available upon request, without cost or obligation.

### To Aid in Athlete's Foot Prevention

Sanitation H T H provides effective fungicidal footbath solutions to help prevent the transmission of athlete's foot. Locker rooms, shower rooms, toilets, pool runways, etc. are, without question, among the worst offenders in the spread of athlete's foot.

Experience indicates that the best preventative is a careful sanitary routine which includes the use of hypochlorite solutions such as those made from H T H



The Peekskill (N. Y.) indoor swimming pool, where Sanitation H T H is used for supplementary hypo-chlorination of the pool water and for general sanitation of the pool surroundings.

and Lo-Bax, both in footbaths and for general disinfection of all surfaces which may transmit infection.

### Sterilizing and Bleaching

School laundries, like commercial laundries, find that H T H solutions are uniform and economical for bleaching and sterilizing linens, towels, uniforms and other white goods, and as a sterilizing rinse for cotton bathing suits. H T H Bleach helps to avoid the danger of over-bleaching, which shortens the life of fabrics, and the alternate danger of inadequate protection.

## OTHER MATHIESON PRODUCTS

**H T H-15**—An all-purpose germicide and deodorant which is ideal for use in school kitchens, dormitories, camps, etc. H T H-15, containing 15% available chlorine, is highly useful as a china dip for the removal of stains from dishes and chinaware.

**Lo-Bax**—A convenient chlorine carrier packed in handy bottles and containing 50% available chlorine. For preparing footbath solutions and for use around shower and locker rooms where limited quantities of hypochlorite are required.

**PH-Plus**—PH-Plus restores the alkalinity which pool water loses during disinfection—eliminates the acidity that makes eyes smart—makes purification more effective and residual chlorine less noticeable. Made in convenient, fused ½-lb. cakes, packed in 100-lb. bags.

**Super-Mafos**—A unique dishwashing detergent in hard briquet form. Super-Mafos offers effective control of alkalinity or wash strength of washwater—assures clean, sanitary dishes.

# WALLACE & TIERNAN

Chlorine and Chemical Control Equipment

Newark 1, New Jersey

## REPRESENTED IN

Albany  
Atlanta  
Austin  
Boston  
Bridgeport  
Buffalo  
Charlotte  
Chicago

Cleveland  
Columbus  
Dallas  
Des Moines  
Denver  
Detroit  
Houston  
Indianapolis

Jacksonville  
Jeffersontown  
Kansas City  
Knoxville  
London  
Lubbock  
Minneapolis

Monrovia  
Montreal  
Oklahoma City  
Philadelphia  
Pittsburgh  
Portland  
Roanoke  
St. Louis

Salt Lake City  
San Francisco  
Seattle  
Syracuse  
Toronto  
Union City  
Washington  
Winnipeg

## WALLACE & TIERNAN COMPANY

Wallace & Tiernan is a completely integrated organization of specialists in chlorination and chemical feeding. For over 35 years this alert, progressive company has pioneered with such well-known developments as the visible vacuum principle in which chlorine is metered under a partial vacuum, the widespread commercial use of Break-Point Chlorination, and the first practical residual chlorine recorder.

In the field of swimming pool treatment, Wallace & Tiernan has a wide variety of time-tested Chlorinators, Hypochlorinators, and Chemical Feeders which can meet the requirements of all pools regardless of size. In addition, Wallace & Tiernan equipment is installed under the direct supervision of a member of the Wallace & Tiernan Technical Service Organization which is conveniently located in the cities listed above.

## W&T EQUIPMENT



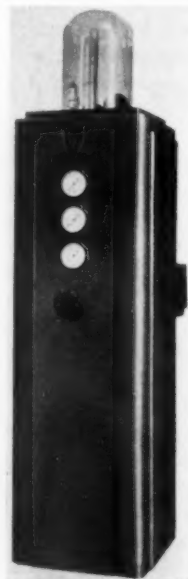
**W&T**  
*Hypochlorinator*  
Type HEMP

### For Small Indoor Pools

W&T Hypochlorinators are particularly adapted to the needs of small pools. These rugged machines are easily installed. They take up only 4 square feet of floor space and require little attention. You just set the feed, turn on the power, and the system starts operating smoothly and efficiently.

These machines are available in the Electric and Belt Driven Types for Manual and Automatic Start and Stop Operation. Two other models using a Water Motor Drive are also available, one for

Manual and the other for Automatic Proportional Control.



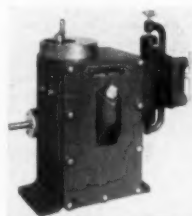
**W&T**  
*Visible Vacuum*  
*Chlorinator*  
Type A-418

### For Large Outdoor Pools

W&T has direct feed, solution feed and visible vacuum feed chlorinators for every type pool. These rugged dependable machines are easy to maintain and require no skilled help to operate. Moreover, shut-down and start-up has been simplified to the point where it can be done easily and quickly—a decided advantage in intermittent pool operation.

### Chemical Feeders

For the precise feeding of controlled amounts of such treatment chemicals as alum, soda ash, etc. W&T Chemical Feeders are compact, dependable machines, especially designed to do an economical, efficient job. They are available in four models, Electric, Belt Driven, Water Motor Drive Manual Control, and Water Motor Drive Automatic Control.



**W&T**  
*Chemical Reagent*  
*Feeder,*  
*Belt Drive,*  
Type HBDM

## SERVICE

The W&T field service staff is always available for service or technical assistance on any chlorination problem.





# LONG ISLAND BLEACHER CO., INC.

33-35 9th Street, Long Island City 6, N. Y.

RAvenswood 8-4453

*Designers, Manufacturers and Erectors of Steel Grandstands  
Permanent and Portable*

## Specifications for Portable Type Grandstand

Stands shall consist of seat and foot boards, supported by structural steel stringers and angle supports, held in position by vertical bents. No loose parts or bolts used.

Structural steel shall conform to the standard specifications of the American Society for Testing Materials for Structural Steel for Buildings, Serial designation A-7-46, as amended to date.

Steel structures shall be so designed as to sustain dead weight imposed upon them, including weight of steel frame, in addition, a live load of 125 lbs. per sq. ft. of horizontal projection. Proper provision is to be made for temporary stress, caused by erection.

**Stringers**—Stringers shall be channel steel, not less than 5-in. channel. Bottom end of stringer shall have bearing plate welded to same for resting on the floor or ground.

**Seat and Foot Board Supports**—Supports shall not be less than  $2 \times 2 \times \frac{3}{16}$ -in. steel angles, riveted to stringer, forming one complete unit. Tops of angle support shall be slotted to receive lip of locking device.

**Seat and Foot Boards**—Seat and foot boards shall be made of selected Oregon fir. Boards to be not less than  $1\frac{5}{8}$ -in. thickness. Seat Boards shall be  $9\frac{1}{2}$  in. wide, and have all sharp edges rounded. One foot board 12 in. shall be in uni-

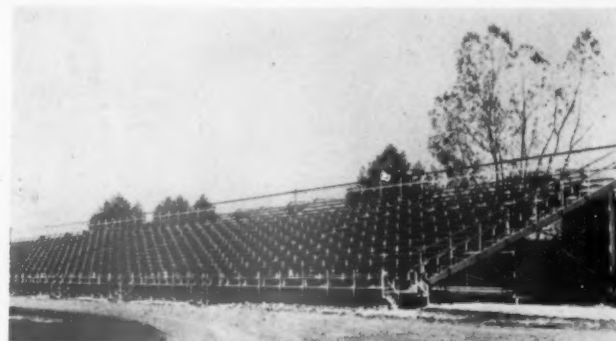
form lengths of 16 ft., unless otherwise specified. All seat and foot boards shall have locking device attached to the underside, for fastening boards to supports, insuring absolute rigidity. Seats shall be spaced not less than 22 in. back to back. Height of seat above foot board shall be not less than 17 in. and the rise per row shall be not less than 8 in.

Locking device to be made of sheet steel plate  $\frac{3}{16} \times 3 \times 8$  in. riveted to underside of seat and foot boards.

**Bents**—Bents shall consist of two vertical struts of  $2\frac{1}{2} \times 2\frac{1}{2} \times \frac{3}{16}$ -in. angle steel, braced horizontally and diagonally to insure rigidity against side sway, tops of each strut shall have proper provision for receiving stringers. Bearing plates,  $6 \times 6 \times \frac{1}{4}$  in. to be welded to foot of each bent, for resting on floor or ground. Horizontal and diagonal braces to be not less than  $2 \times 2 \times \frac{3}{16}$ -in. steel angles, and shall be welded to struts.

	2 Rows	3 Rows	4 Rows	5 Rows	6 Rows	7 Rows	8 Rows	9 Rows	10 Rows
Total Depth	2'-7½"	4'-5½"	6'-3½"	8'-1½"	9'-11½"	12'-3"	14'-1"	15'-11"	17'-6"
Height Top Seat	1'-10"	2'-4½"	2'-10¼"	3'-5½"	3'-11½"	4'-6½"	5'-1½"	5'-8½"	6'-3½"
Length	←								
No. Units	←								
SEATING CAPACITY									
16'	1	24	36	48	60	72	84	96	108

Seating capacity based on a width of 16" per seat, can be determined by multiplying the number of units by the figures indicated above.



## Steel Deck Grandstands

This stand is made of  $\frac{1}{4}$ -in. plate steel, risers and treads in one piece, supported on heavy steel columns. The space under the stand may be used for any purpose desiring shelter because the deck is waterproof. The seat construction is the same as our other type stands.

## WILLIAMS Portable Fencing



Simple, practical, low cost way to control crowds. When not in use this restraining apparatus is easily dismantled and stored away in limited space. Stanchions set up every 50 feet. Write for price on your requirements.

For further details we suggest that you write to this office for literature and the name of our local representative. He will consult with you on your plans and provide any desired assistance without obligation.

## Specifications for Permanent Steel Grandstands

**Steel**—Steel, whenever used, shall conform to the Standard Specifications of the American Society for Testing Materials for Structural Steel for Buildings A-7 as amended to date.

All structural members shall be not less than  $\frac{1}{4}$  in. thick, except for the web of rolled structural shapes which shall be not less than seventeen one-hundredth (.17) of an inch thick.

Columns to be 8 in.; spaced 18 ft. on center.

Channel stringers to be 12 in.; 6 ft. on center.

Foot board supports to be  $2 \times 2 \times \frac{1}{4}$ -in. angles, riveted and welded to channel stringers.

Framing to support channel stringers to be 12 and 15-in. I-beams.

Diagonal and longitudinal bracing to be of 1-in. rods.

Railing to be of pipe and angles.

All shop connections to be riveted and field connections to be bolted.

**Lumber**—Seat boards to be  $2 \times 10$ -in. Clear Oregon Fir dressed.

Foot boards to consist of two  $2 \times 10$ -in. Clear Oregon Fir dressed.

All to be bolted to structural steel members by  $\frac{5}{16}$ -in. carriage bolts.

**Painting**—All steel and lumber to be painted one coat of paint in the shop.

# HORN BROTHERS COMPANY

DIVISION OF HORN INDUSTRIES

Fort Dodge, Iowa

**HORN**  **ORIGINATORS AND WORLD'S LARGEST MANUFACTURERS OF FOLDING BLEACHERS AND PARTITIONS**

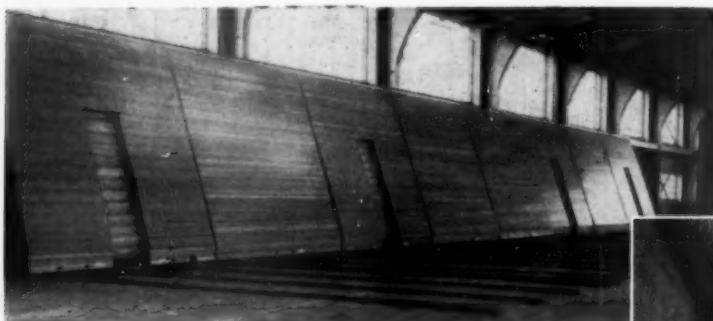
SINCE 1909

Today's Gym requirements and the utilization of all available space is easily acquired with the use of HORN FOLDING BLEACHERS AND AUTOMATIC ELECTRIC FOLDING PARTITIONS. HORN, since 1909, manufacturers of quality equipment has an Engineering Department with the "know how" to meet your Gymnasium problems. Let HORN "iron out" your problems!

**UTILIZE YOUR GYMNASIUM SPACE  
HORN FOLDING PARTITIONS AND BLEACHERS**



● **HORN FOLDING PARTITIONS** — Large, Small, Electric or Manual — Horn factory built and installed. Folding Partitions are designed to your particular requirements. Contact the Horn Representative in your locality or Write for the HORN FOLDING PARTITIONS CATALOG.



● **Field House, Gymnasium, Stages** — Horn Folding Bleachers can be designed to utilize needed space. With Horn Folding Bleachers and Folding Partitions you can have 3 Gyms in 1. Time Tested Design — Quality Workmanship — Space Utilization — A Horn Installation means satisfaction.



## HORN FOLDING BLEACHERS

Save space, labor and increase your seating capacity with comfort and safety. HORN Folding Bleachers are factory built and installed.



## THE HORN BROTHERS CO.

Horn Brothers Co., established in 1909 offers Folding Bleachers and Partitions built completely in a new, modern factory. None of the work is sublet to local mills. You are therefore assured of quality and uniformity. The Horn Engineering department and manufacturing facilities plus factory installation insures smooth, trouble-free operation through the years. It costs no more to have the finest.

**HORN BROTHERS COMPANY**  
DIVISION OF HORN INDUSTRIES  
FORT DODGE, IOWA, U. S. A.

## THE NEW HORN FOLDING STAGES



● The Horn Folding Stages available in 6 feet to 16 foot widths can be used in multiples for maximum stage space as required. Eliminate cumbersome, heavy, space taking Stage with the Horn Folding Stages.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

### BLEACHER SPACE REQUIREMENTS

Rows	FLOOR SPACE		** Height
	In Use	* Closed	
3	4 Ft. 9 In.	1 Ft. 8 3/4 In.	3 Ft. 0 In.
4	6 Ft. 7 In.	2 Ft. 0 1/8 In.	3 Ft. 9 In.
5	8 Ft. 5 In.	2 Ft. 3 1/2 In.	4 Ft. 6 In.
6	10 Ft. 3 In.	2 Ft. 6 7/8 In.	5 Ft. 3 In.
7	12 Ft. 1 In.	2 Ft. 10 1/4 In.	6 Ft. 0 In.
8	13 Ft. 11 In.	3 Ft. 1 3/8 In.	6 Ft. 9 In.
9	15 Ft. 9 In.	3 Ft. 5 In.	7 Ft. 6 In.
10	17 Ft. 7 In.	3 Ft. 8 3/8 In.	8 Ft. 3 In.
11	19 Ft. 5 In.	3 Ft. 11 3/4 In.	9 Ft. 0 In.
12	21 Ft. 3 In.	4 Ft. 3 3/8 In.	9 Ft. 9 In.
13	23 Ft. 1 In.	4 Ft. 6 1/2 In.	10 Ft. 6 In.
14	24 Ft. 11 In.	4 Ft. 9 7/8 In.	11 Ft. 3 In.
15	26 Ft. 9 In.	5 Ft. 1 1/4 In.	12 Ft. 0 In.
16	28 Ft. 7 In.	5 Ft. 4 5/8 In.	12 Ft. 9 In.
17	30 Ft. 5 In.	5 Ft. 8 In.	13 Ft. 6 In.
18	32 Ft. 3 In.	5 Ft. 11 3/8 In.	14 Ft. 3 In.
19	34 Ft. 1 In.	6 Ft. 2 3/4 In.	15 Ft. 0 In.
20	35 Ft. 11 In.	6 Ft. 6 1/8 In.	15 Ft. 9 In.

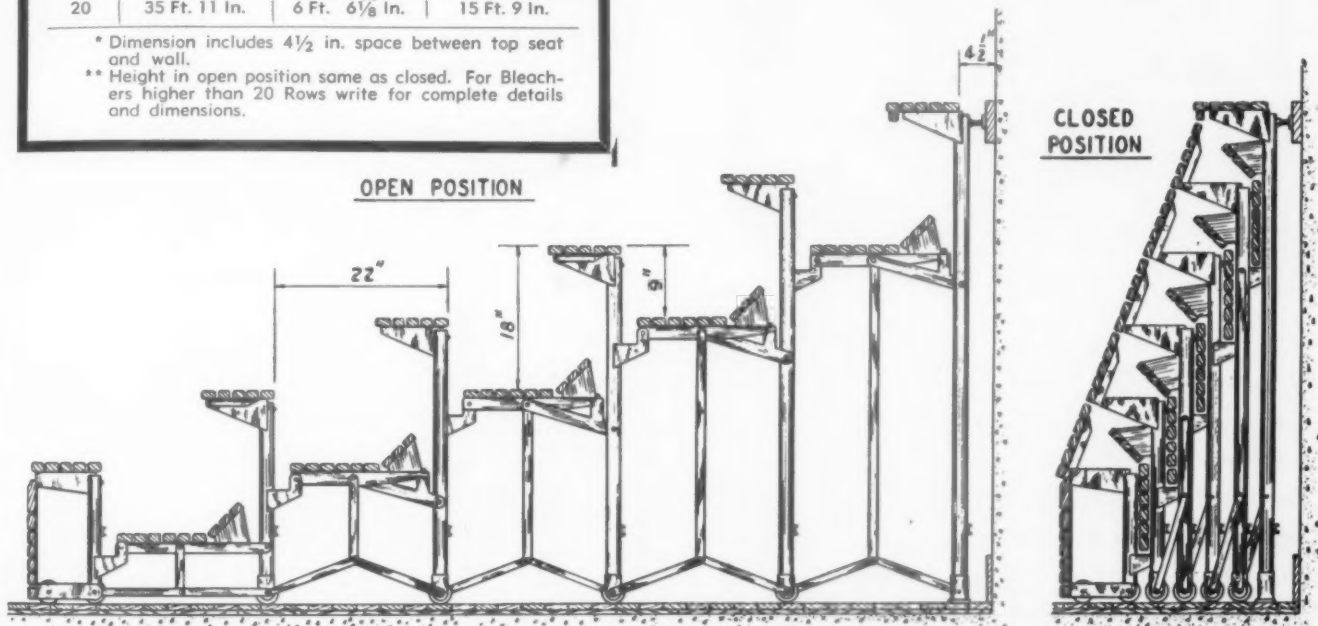
\* Dimension includes 4 1/2 in. space between top seat and wall.  
 \*\* Height in open position same as closed. For Bleachers higher than 20 Rows write for complete details and dimensions.

### HORN FOLDING PARTITIONS

Specifications and general information on Horn Folding Partitions are now available in the New Horn Folding Partitions Catalog. There is a copy for YOU! Get the complete facts.

### HORN FOLDING BLEACHERS

Compare the many advantages of Horn Folding Bleachers. Horn Folding Bleachers are now installed in most of the world's finest gymnasiums.



### SPECIFICATIONS FOR HORN FOLDING BLEACHERS

#### A. GENERAL SCOPE

1. All folding bleachers shown on the plans shall be Horn Accordion Folding Bleachers as manufactured by the HORN BROTHERS COMPANY, Fort Dodge, Iowa.
2. Bleachers shall be furnished, delivered and installed by factory-trained mechanics. The entire installation shall be guaranteed against faulty materials, workmanship and operation.
3. Quantities are as follows: Total length of sections shall be ..... consisting of ..... rows. When closed, seats shall not extend from the wall in excess of ..... when open, seats shall not extend from the wall in excess of ..... The height of the bleachers shall remain the same open or closed. (A "section" is a group of units in one continuous length.)

#### B. PRINCIPLE

1. Bleachers shall operate on the telescoping principle, whereby all seats fold below the top seat, accomplished by means of folding arms. No rollers or slides will be permitted. Units shall be fitted with heavy duty rollers to prevent marring floor. Bleachers shall open in one continuous operation and shall be so constructed that one or more rows may be opened ready for use with the rest of the unit remaining in a closed position.
2. Provide automatic locking equipment which shall lock the bleachers in an open position without the use of bolts or floor sockets. Provide cylinder locks, keyed alike to lock bleachers in closed position.
3. When bleachers are in a closed position, the seatboards shall automatically rise to an upright position to completely enclose the unit. Bleacher seats in closed position must tilt to form a safety inclining front.

#### C. DESIGN

1. Bleachers when in use shall be designed and constructed to safely support, in addition to their own weight, a live load

of 120 lbs. per lineal foot on both seatboard and footboard and a horizontal swaying force applied to the seats of 24 lbs. per lineal foot of seats plus a factor of safety of 4.

2. Each row shall have a depth of not less than 22", and a rise above the next row of not less than 9" to insure a good visibility.
3. Bleachers in the folded position shall form a complete covering, offering no space for basketballs, handballs, etc., to become lodged behind or underneath.
4. Seat and footboards to be furnished which will allow free circulation of air through bleachers from radiators or heating units.

#### D. CONSTRUCTION

1. All sections shall be fabricated at factory, using electric arc welding for steel members and wood for seat and footboards, ready for assembly at site.

##### a. SEAT AND FOOTBOARDS

1. Seat and footboards shall be genuine vertical grain Douglas Fir, 1 1/4" stock, carefully sanded before finishing.
2. Ends of seat and footboards shall be fabricated with wood cleats, nailed and glued under pressure to prevent warping, cupping and to insure perfect alignment.

##### b. COLUMN SUPPORTS

1. All column supports to have cold-rolled steel sway brace members to prevent lateral motion and eliminate need of wood riser members for structural strength.
2. There shall be four structural supports to each seatboard and footboard on standard 16' sections.

#### E. FINISH

1. Woodwork shall be finished with two coats of the best quality bakelite sealer in a standard color.
2. Steel understructure shall be given two coats of School Furniture Brown Enamel.

HORN BROTHERS COMPANY

FORT DODGE, IOWA, U.S.A.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



# LEAVITT CORPORATION

(ESTABLISHED 1895)

206-220 Griggs Street, Urbana, Illinois

Originators and Sole Manufacturers of the Famous  
**KNOCKDOWN** Portable Wood Bleachers. Also Steel  
 Grandstands, Stadiums, and Telescoping Bleachers



## A Typical 10 Row Type R **KNOCKDOWN** Portable Wood Bleacher

The ideal all purpose bleacher for use on football field, gym, etc.

Easy to erect. Easy to dismantle and move.

Designed for safety, comfort, and economy these bleachers are constructed from the finest kiln Dried Douglas Fir lumber. All parts are laboratory tested for complete safety.

CAPACITY TABLE FOR **KNOCKDOWN** PORTABLE WOOD BLEACHERS

ROWS HIGH...	5	6	7	8	9	10	15	20
Length of Group	Total Seating Capacity							
15 ft.	55	66	77	88	99	110	165	220
45 ft.	165	198	231	264	297	330	495	660
60 ft.	220	264	308	352	396	440	660	880
90 ft.	330	396	462	528	594	660	990	1320
120 ft.	440	528	616	704	792	880	1320	1760
150 ft.	550	660	770	880	990	1100	1650	2200
180 ft.	660	792	924	1056	1188	1320	1980	2640
240 ft.	880	1056	1232	1408	1584	1760	2640	3520
300 ft.	1100	1320	1540	1760	1980	2200	3300	4400
Depth front to back .....	8' 8"	10' 7"	12' 6"	14' 4"	16' 3"	18' 2"	27' 8"	37' 1"
Height of top row .....	3' 10"	4' 6"	5' 1"	5' 9"	6' 4"	7' 0"	10' 1"	13' 3"

Other sizes in height, length, and number of rows are available. Most economical to purchase are 5 rows, 7 rows, and 10 rows.



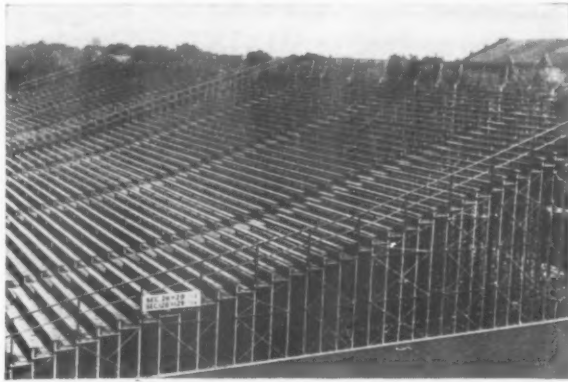
When not in use this bleacher telescopes against walls to a space of only 32".

Extended it forms safe, comfortable seating for spectators. Standard section lengths are 16' and 12'.

DIMENSIONS . . . TELESCOPING BLEACHERS

Tier	DEPTH Extended Nested		HEIGHT Extended or Nested		Tier	DEPTH Extended Nested		HEIGHT Extended or Nested	
3	4' 6"	2' 8"	2' 10 1/2"		7	11' 10"	2' 8"	6' 0 1/2"	
4	6' 4"	2' 8"	3' 8"		8	13' 8"	2' 8"	6' 10"	
5	8' 2"	2' 8"	4' 5 1/2"		9	15' 6"	2' 8"	7' 7 1/2"	
6	10' 0"	2' 8"	5' 3"		10	17' 4"	2' 8"	8' 5"	

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



This sturdy steel grandstand serves all seating needs.

Fully bolted construction insures maximum rigidity and safety as well as avoiding vandalism and theft.

Easily moved and erected.

Choose the height and length desired from column at right.

Stand may be elevated with front walkway or non-elevated.

CAPACITY TABLE FOR PORTABLE STEEL GRANDSTANDS

ROWS HIGH...	5	6	7	8	9	10	15	20
Length of Group	Total Seating Capacity							
18 ft.	65	78	91	104	117	130	195	260
54 ft.	195	234	273	312	351	390	585	800
90 ft.	325	390	455	520	585	650	975	1340
126 ft.	455	546	637	728	819	910	1365	1880
162 ft.	585	702	819	936	1053	1170	1755	2420
198 ft.	715	858	1001	1144	1287	1430	2145	2960
234 ft.	845	1014	1183	1352	1521	1690	2535	3500
270 ft.	975	1170	1365	1565	1755	1950	2925	4040
306 ft.	1105	1326	1547	1768	1989	2210	3315	4580
Depth front to back .....	8' 10"	10' 10"	12' 10"	14' 10"	16' 10"	18' 10"	28' 10"	38' 10"
Height of top row .....	4' 0"	4' 7½"	5' 3"	5' 10½"	6' 6"	7' 1½"	10' 3"	13' 4½"

Other sizes in height, length, and number of rows are available. Most economical to purchase are 6, 10, 15, and 20 rows. Actual dimensions may vary slightly from those shown.



For those who desire a permanent installation with space beneath for dressing room and storage space the ADD-A-SEAT stadium is the answer.

Heavy duty construction and comfortable seating stamp it as one of the finest. Standard heights are 16, 24 and 32 Rows.

Our engineering department is ready to assist you, without charge, in preparing layouts and plans. Write, wire or phone collect for estimates

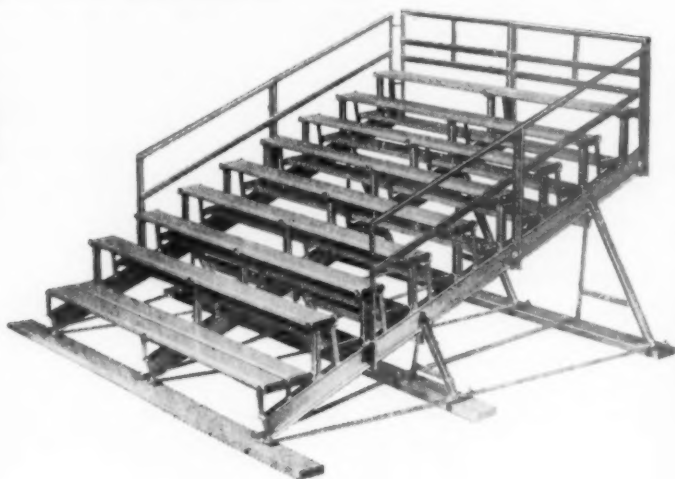
THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# HUSSEY MFG. CO., INC.

NORTH BERWICK • Ironworkers Since 1835 • MAINE

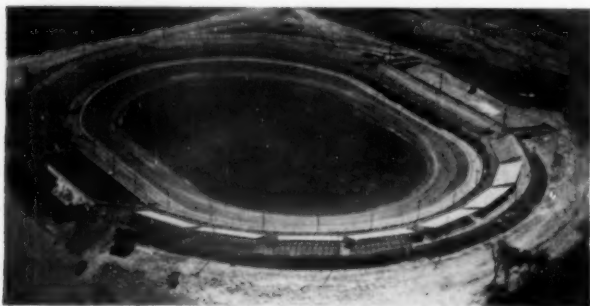


*Announcing!*  
**NEW MODEL '8'**  
(PATENTED)



## STEEL PORTABLE GRANDSTANDS

THE FIRST AND ONLY PORTABLE GRANDSTAND THAT IS  
REALLY AND TRULY DEMOUNTABLE AND PORTABLE



NORWOOD ARENA, Norwood, Mass. An example of "bowl type" installation with Hussey Portable Bleachers. Safe, comfortable, economical seating for 13,080 persons.



HOLY CROSS COLLEGE, Worcester, Mass. Another example of the practicality and economy of Hussey Portable Bleachers. This stand, or any part of it, may be easily and quickly moved for use elsewhere—indoors or out.



Also  
**WATER SPORTS EQUIPMENT**  
Diving Boards  
Swimming Floats — Float Ladders

This new model retains all the features (flexibility, portability, safety, etc.) of the famous Hussey Model 6 Portable Bleachers, and combines with them the advantages and comfort of modern grandstand construction.

With its extra room between rows and wider footboards placed above the stringers, Model 8 is easier of access, more comfortable, and at the same time exceptionally economical. Even built in aisles are furnished if desired.

Like the Hussey Model 6 Bleacher, this new portable grandstand can be erected or taken down more quickly, and stored in smaller space than any other stand on the market—can be set up at the rate of 1.2 minutes per seat per man, and taken down at the rate of 1.0 minute per seat per man. This has been proved by one of the Country's leading engineering institutions.

Ask about our new plan for financing Hussey Safe Seating Equipment.

### PORTABLE BLEACHERS (Model 6)

The most practical, and by far the most economical to buy and maintain, as well as the safest and lightest steel supported portable bleachers on the market. More than a million seats now in use. Always "in stock" for immediate shipment. You can buy a 6 tier set, and then increase to 10 or 15 tiers or add more sections without any changes whatsoever.

### PERMANENT GRANDSTANDS

Designed of steel by Hussey trained seating engineers to solve any and all seating problems regardless of size or type—open and closed decks—concrete or brick exteriors—bowl, horseshoe or straight designs.

**Note:** Hussey Seating Equipment is now available on the West Coast, making possible economical shipments to the Western States.

### DIVING BOARDS — SWIMMING FLOATS

For water sports equipment for pool or summer camp use, be sure to get information and prices on Hussey Diving Boards, Swimming Floats, Ladders, etc. Send for special Water Sports Catalog today.

**FREE** descriptive folders and quotations on Hussey seating equipment are yours for the asking. Write, wire or phone today!

## HUSSEY MFG. CO., INC.

504 RAILROAD ST. • N. BERWICK, MAINE

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



# PITTSBURGH - DES MOINES STEEL COMPANY

Plants at Pittsburgh, Pa. • Des Moines, Iowa • Santa Clara, Calif.

## Sales Offices at

Pittsburgh, 3425 Neville Island • Des Moines, 924 Tuttle St. • New York, Room 994, 270 Broadway • Dallas, 1224 Praetorian Bldg. • Chicago, 1215 First National Bank Building • Seattle, 915 Lane St. • Santa Clara, 614 Alviso Road



## Steel Deck Grandstands



New Castle High School, New Castle, Pa.  
Seating Capacity — 7200



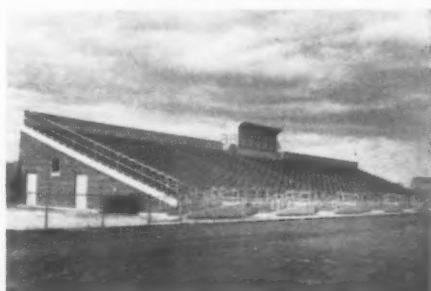
Tulsa University, Tulsa, Okla.  
Seating Capacity — 5500



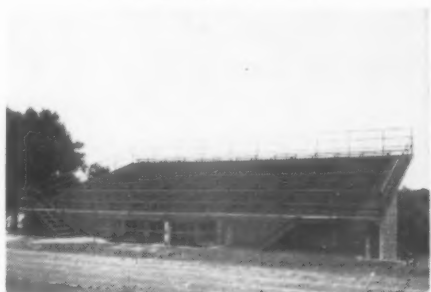
Woodrow Wilson High School,  
Long Beach, Calif. Seating Capacity — 2000  
Unitized Construction



Lincoln High School, Des Moines, Iowa  
Seating Capacity — 550



Allegheny College, Meadville, Pa.  
Seating Capacity — 2880



Paulsboro High School, Paulsboro,  
New Jersey. Seating Capacity — 960

Pittsburgh-Des Moines Steel Deck Grandstands serve schools and colleges from coast to coast with maximum values of safety, comfort, permanence and fine appearance for mass outdoor seating. Employing a unique system of unitized construction, these Grandstands permit complete design flexibility and rapid, economical erection. Built in standard sections, the original installation can be small or large, according to requirements; sections can be added at any time to increase capacity in depth, width or both. Units may be built along one, two or three sides of the field, or may completely enclose it. When assembled by bolts, stands may be dismantled and re-erected at a new location if desired; welded construction may be employed for permanent installation.

### WEATHERTIGHT DECKS

Pittsburgh-Des Moines Grandstands have weathertight steel decks supported by heavy steel underbracings. The underdeck space may be utilized for dressing rooms, toilet facilities, storage, etc.; when desired, masonry walls may be built along the ends and back of the stands to provide a total enclosure of the space under the stands. These Grandstands are finished complete with guardrails, steps or ramps, and built-in press box, if specified. Cast iron or welded steel stools, securely bolted to the deck, support the wood seat planks; other types of seats are furnished if desired.

### SEATING CAPACITY

Pittsburgh - Des Moines Steel Deck Grandstands are built in standard sections 18 feet long by 10 rows deep. Allowing 16½" per seat, one section

will seat 120 people. If 18" are allowed per seat, each section will seat not less than 110 people. A stand may be any number of sections long by any number of sections deep, with special sections provided for corners and to utilize all space available.

### ECONOMY

The permanence of Pittsburgh-Des Moines Grandstands makes them a lifetime investment. They do not weather, rot or decay and, therefore, will not weaken or collapse. Their first cost is low, and they have a high salvage value. The only maintenance necessary is an occasional coat of paint, which keeps them looking new year after year. You are cordially invited to write to our nearest office for current literature; a Pittsburgh-Des Moines representative will be glad to consult with you on your future plans, and to provide any desired assistance without obligation.

# QUEENSBORO STEEL CORPORATION

47-29 Van Dam Street, Long Island City 1, N. Y.

## PORTABLE BLEACHERS

*For Indoor or Outdoor Use*

### "QSC" BLEACHER ADVANTAGES

For public schools and colleges desiring the maximum in strength, durability and safety combined with easy portability and expandability, we suggest looking into the outstanding features of "QSC" Portable Bleachers. Our large plant facilities permit exceptionally attractive prices.

### STRONG — SAFE — DURABLE

The engineered design provides for a structural unity which assures users of maximum safety. Rigid panel frame construction supports the load from any two points of support. (Uneven ground presents no problem.) Welding by certified welders insures safety and years of trouble-free service. Cross bracing, both diagonal and horizontal, provides maximum rigidity. Standardized prefabricated parts of high quality are used throughout. Seats and footboards are of 2"x10"x16" Select structural West Coast Douglas Fir, painted with rust-inhibitive paint. All steel members are painted with a heavy coat of red lead or green paint. End rails, where used, are of smooth pipe construction, for better appearance, greater strength and safety.

### COMFORTABLE

Seats are extra wide, for comfort. There is sufficient room between rows to permit free leg room. Footboards are 18 inches wide, providing sufficient walking space. Because the seatboard overhangs, there is no open space for walkers to slip through. A rise of 9 inches between seatboards provides ample, unobstructed vision.

### BUILT TO SUIT INDIVIDUAL REQUIREMENTS

Dimensions and seating capacities are provided in great variety, as shown in the table below. Aisles and stairways, sizes of risers and treads, can be constructed to fit individual requirements.

### EXPANDABLE

The simple design and interchangeability of parts of the QSC stand allows the length or height of the stand to be increased as needed, as your demand for seating capacity increases. Combination grandstand-and-bleacher assemblies can be constructed.

### PORTABLE

QSC bleachers are easy to erect, easy to dismantle, easy to move from place to place, and, because of their compactness, can be stored in minimum space.

*Further information will be gladly furnished*

TABLE OF DIMENSIONS AND SEATING CAPACITY

BASED ON A WIDTH OF 16" PER SEAT															
		No Railings					With Railings								
		2 Rows	3 Rows	4 Rows	5 Rows	6 Rows	7 Rows	8 Rows	9 Rows	10 Rows	11 Rows	12 Rows	13 Rows	14 Rows	15 Rows
Total Depth		2'-7½"	4'-5½"	6'-3½"	8'-1½"	10'-5"	12'-3"	14'-1"	15'-11"	17'-9"	19'-7"	21'-5"	23'-3"	25'-1"	26'-11"
Height top seat		2'-1"	2'-9"	3'-5"	4'-1"	4'-9"	5'-5"	6'-1"	6'-9"	7'-5"	8'-1"	8'-9"	9'-5"	10'-1"	10'-9"
Length	No. Units	SEATING CAPACITY													
16'	1	24	36	48	60	72	84	96	108	120	132	144	156	168	180
32'	2	48	72	96	120	144	168	192	216	240	264	288	312	336	360
48'	3	72	108	144	180	216	252	288	324	360	396	432	468	504	540
64'	4	96	144	192	240	288	336	384	432	480	528	576	624	672	720
80'	5	120	180	240	300	360	420	480	540	600	660	720	780	840	900
96'	6	144	216	288	360	432	504	576	648	720	792	864	936	1008	1080
112'	7	168	252	336	420	504	588	672	756	840	924	1008	1092	1176	1260
128'	8	192	288	384	480	576	672	768	864	960	1056	1152	1248	1344	1440
144'	9	216	324	432	540	648	756	864	972	1080	1188	1296	1404	1512	1620
160'	10	240	360	480	600	720	840	960	1080	1200	1320	1440	1560	1680	1800

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# REPUBLIC STRUCTURAL IRON WORKS

1291 E. 53 St., Cleveland 14, Ohio

For a Better Buy in Spectator Seating . . .

## REPUBLIC STEEL GRANDSTAND

With Non-Skid Footplates and Walkways

*Gives you important advantages in...*

**SAFETY • PERMANENCE • LOW MAINTENANCE COST**

- Non-Skid Steel Footplate
- Non-Skid Aisleways
- Elevated Sections
- Bolted Construction — Quick Installation
- Usable Under-the-Stand Space
- Adaptable to Unusual Ground Conditions

*Write or Call* for complete information. When contacting our engineering department, information on number of seats, number of rows high, elevated or ground installation, and any special grade conditions will help us give a more detailed and constructive reply. Literature available.



**REPUBLIC STRUCTURAL IRON WORKS**

1291 E. 53rd STREET • CLEVELAND 14, OHIO • EN. 1-4400



# FRED MEDART PRODUCTS, INC.

3550 DeKalb St.

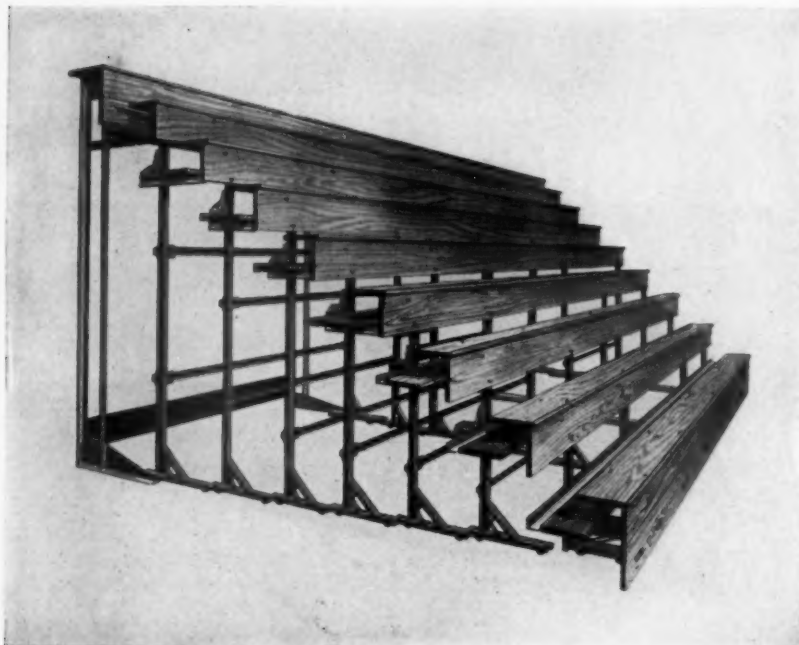
St. Louis 18, Missouri

SALES ENGINEERS IN ALL PRINCIPAL CITIES

## MEDART TELESCOPIC GYM SEATS

Space - saving!  
Revenue - producing!

### WALL-ATTACHED TYPE



Revenue from basketball crowds makes provision of adequate seating a prime consideration in gymnasium planning! Adequate floor space for class activities is equally important. Medart Telescopic Gym Seats offer, at lower cost, the same facilities, convenience and safety as permanent built-in seating, yet provide maximum floor area for other activities when seats are not required.



"NESTED" POSITION  
6-row installation

Feature of this modern seating is ease with which seats move in and out of "nested" position in one operation—metal-to-metal contact, no wood inserts. "Nested" position requires only 32" floor space. Special wall reinforcement unnecessary—load distributed on floor rather than wall. Casters carry dead load only, "live" spectator load carried on upright, direct contact to floor—eliminates floor depressions.

Steel understructure, uprights of "H" beam and structural channel construction for vertical strength and balanced support. Spacer angles and cross channels of steel. Selected lumber throughout—full length—full width . . . one piece!

CHECK THESE SPACE REQUIREMENTS . . .							
No. of Rows	Floor Space		Height—Open or Closed	No. of Rows	Floor Space		Height—Open or Closed
	Extended	Closed			Extended	Closed	
3	4' 6"	2' 8"	3' 0"	12	21' 0"	4' 11"	10' 6"
4	6' 4"	2' 8"	3' 10"	13	22' 10"	4' 11"	11' 4"
5	8' 2"	2' 8"	4' 8"	14	24' 8"	4' 11"	12' 2"
6	10' 0"	2' 8"	5' 5"	15	26' 6"	4' 11"	13' 0"
7	11' 10"	2' 8"	6' 4"	16	28' 4"	4' 11"	13' 10"
8	13' 8"	2' 8"	7' 2"	17	30' 2"	4' 11"	14' 8"
9	15' 6"	2' 8"	8' 0"	18	32' 0"	4' 11"	15' 6"
10	17' 4"	2' 8"	8' 10"	19	33' 10"	4' 11"	16' 4"
11	19' 2"	2' 8"	9' 8"				

NOTE: Space of 3" to 4" recommended between top seat and wall.

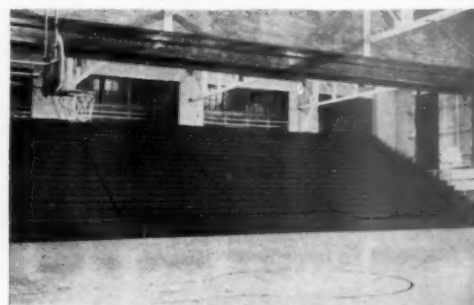
Medart Telescopic Gym Seats available, as illustrated, in wall attached, movable, high row (up to 20 rows high) and recessed types. Write for descriptive literature. Send your plans for suggestions.

### MOVABLE TYPE



Safe seating that can be quickly and easily moved from one location to another—ideal for stage, combination lecture and classrooms, to encompass a boxing or wrestling ring, etc.

### HIGH-ROW TYPE



Provides safe seating for extra large crowds—"gives back" valuable areas of floor space for other activities, i.e., 19-row section, seating over 200 people, 400 sq. ft. floor space regained when seats are closed.

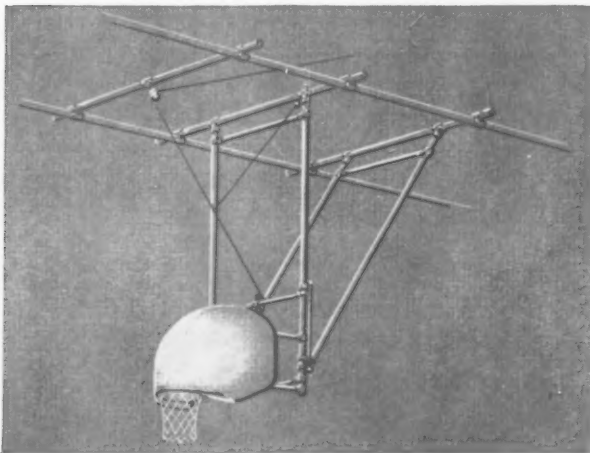
### TWO-LEVEL SEATING



Accommodates capacity crowds on both main floor and balcony areas, releases maximum floor space for multi-purpose uses. Further practical value, combined with recessed installation, when seats are placed under balcony or structural conditions make 32" (or deeper) recess available.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

## MEDART BASKETBALL BACKSTOPS



Medart has a complete line of basketball backstops "tailored" to meet any structural condition. Strong, rigid, with minimum bank vibration, Medart Backstops are expertly designed and fabricated of the best materials. All conform to current Official Basketball Rules for equipment. Standard equipment includes steel fan-shaped, rectangular wood or Herculite backboards, with "Orange" goals.

Medart Engineers are available to help plan the most efficient, economical installation for your own special requirements at no obligation. Write for descriptive literature. Send your plans for suggestions.



## MEDART GYMNASIUM APPARATUS



Medart Gymnasium Apparatus, modern with a high degree of safety, service and durability, is today accepted as the ultimate in gymnastic equipment perfection. Integrating careful, skillful manufacturing with exacting design, best materials, huge production facilities and knowledge of superior equipment requirements, acquired by experience and research with Physical Educators, Medart Gymnasium Apparatus qualifies as ideal for your needs.



Medart supplies every type of apparatus for the modern gym. With more than seventy-five years of experience, Medart has successfully overcome every possible installation problem caused by unusual structural conditions. Medart Engineering Planning Service is available without obligation to every architect and purchaser with installation problems. Write for descriptive literature.



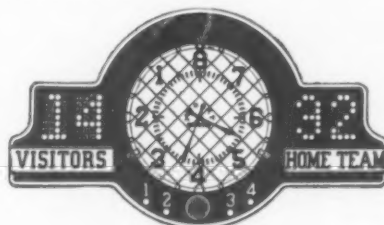
## MEDART SCOREBOARDS

Here's real "big-time" equipment! Medart Basketball and Football Scoreboards are designed for highest possible visibility and good appearance. Their mechanical excellence in-

sures rapid, trouble-free operation. Write for descriptive literature.



NO. 3500  
Basketball Scoreboard



NO. 1000  
Basketball Scoreboard



NO. 3000  
Football Scoreboard



DISTRIBUTORS IN  
PRINCIPAL CITIES

## SAFWAY STEEL PRODUCTS, INC.

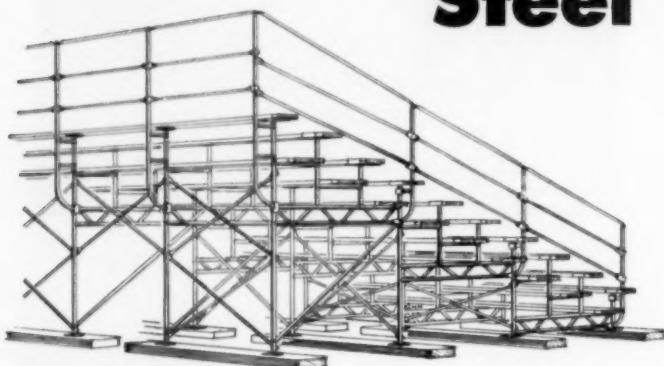
6229 W. STATE ST.

MILWAUKEE 13, WIS.

Manufacturers of

**Tubular Steel Scaffolding, Grandstands,  
Bleachers and Other Steel Products**

(Below) Typical Safway Portable Steel Bleacher Section—Each basic unit is 6 ft. wide by 6 ft. deep and provides 3 rows of seats. More sections are added at sides and back to obtain required capacity.



**Safway Combination Grandstand and Bleacher Assembly**—Provides 2376 grandstand chairs and 9831 bleacher seats at Braves Field, Boston, Mass. (Boston National League Baseball Club). Erected yearly for football season; dismantled and stored during baseball season.

### BUILDING MAINTENANCE EQUIPMENT

#### Steel or New Aluminum Rolling Work Towers



(Illustrated at left) Follow progressive work—may be used indoors or outside. Casters lock at work location. Towers are easily assembled to height and shape required for the individual job. Now available in both tubular steel and new lightweight aluminum equipment.

#### Safway Hydro-Lift

One-man rolling work tower. Lift raises from 7 to 17 ft. on hydraulic ram, operated by worker from platform. Tower telescopes to clear small doors, 30 in. wide by 84 in. high.

## Permanent and Portable Steel GRANDSTANDS and BLEACHERS ... Engineered BY SAFWAY

For permanent or temporary seating structures, either outdoors or inside. Stands of any required length, depth or shape may be assembled rapidly from standard Safway parts. Unskilled help can handle this job without special tools. The simple construction of individual members and the complete stand keeps erection costs at a minimum; Safway's *engineered design* provides incomparable safety.

- **ENGINEERED DESIGN**—Sturdy tubular steel frame members are made with close tolerances to assure rigid joints. Cross braces secured with studs and wing nuts; sections added in height and depth with coupling pins. Simple fasteners hold seat and floor planks securely.
- **MAXIMUM PORTABILITY**—Erection time minimized by interchangeability and convenient size of Safway parts. Dismantling and storage equally easy; parts may then be re-used in the same or any other form. More sections or rows can be added at any time.
- **MAXIMUM SAFETY**—Rigidity and structural unity of complete stand is assured by Safway design. Heavy loads and sudden crowd strains distributed evenly throughout framework by system of *continuous cross bracing*. No independent towers, A-frames or stringers.
- **SUPERIOR VISION**—Every seat a good seat. Steep pitch of not less than 8½" rise between seat rows permitted by inherent strength of tubular members and Safway engineered design.

#### WRITE FOR ESTIMATE

Write Safway, at address given above, for additional information. Include dimensions of space available and seating capacity desired. We will assist in working out your bleacher problems and will furnish an estimate suited to your specific requirements.

(Right) Small Safway Bleacher—Provides 720 seats for Rotary Club, Wayne, Mich. Used for football and other events.





# UNIVERSAL BLEACHER COMPANY

Folding Gymnasium Seating and Outdoor Grandstands

606 South Neil Street, Champaign, Ill.

Get The Most Out of ANY GYMNASIUM AREA  
with . . . *Universal Seating*



## Factual Example:

(GYM DIMENSIONS 140' x 150')

**12,790 SQ. FT. MORE**

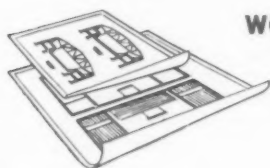
USABLE FLOOR SPACE

**1,030 MORE REVENUE-**

PRODUCING SEATS

**\$27,000 LOWER SEATING COSTS**

Actual comparisons in a given gym area show these outstanding advantages of modern two-level seating . . . with Universal Folding Stands . . . over old type built-in seating. Total seating capacity can be increased up to 40% . . . yet, in this case, there is also a gain of 12,790 square feet of floor space when stands are folded. On the balcony level alone, ample area is provided for practice wrestling, boxing, corrective physical education, etc. Gains in main floor space result in one or two extra basketball cross-courts plus additional space for physical education and specialized training. Total seating costs are usually cut in half . . . and the flexibility of Universal Folding Stands assures easy co-ordination with your plans for roof trusses, exit space, window location, shower and locker room facilities. See *Sweet's Catalog*, section 23-g/2. Additional literature free on request.



### WORKING SCALE BLUEPRINTS

of the gymnasium seating plan described are available without cost . . . also complete literature, including comprehensive studies of gymnasium seating by Harold R. Sleeper. F.A.I.A.



With Universal Stands in folded position, thousands of square feet of extra floor space is made available on each level in 15 minutes.



Universal Stands are installed in sections; may be opened or folded back by sections when and as needed. Exceptionally convenient!



With Universal Stands open, every available square foot outside the basketball floor is converted into revenue-producing seating.

# WAYNE IRON WORKS

Wayne  Penna.

**Manufacturers of Portable Steel Grandstands, Permanent Steel Grandstands and Stadiums and Rolling Gymstands**

These two pages are designed to help you determine the type of Grandstand or Gymstand that best meets your requirements. Each of the many types of Wayne Stands are pictured and briefly described.

Check the features of each against your specifications until you determine the type you want, then—when this has been done—write us for detailed, technical information on the stand of your choice. Complete information will be sent to you at once.



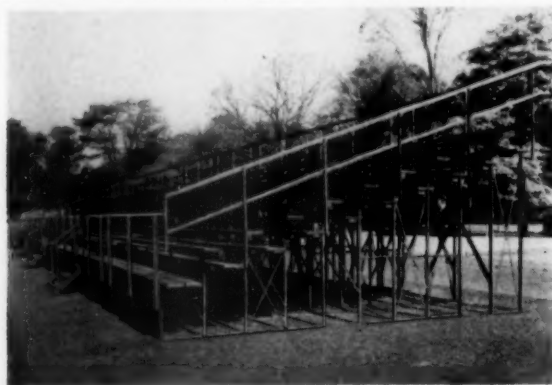
**TYPE "G" PORTABLE GRANDSTAND**

This stand is designed for use on athletic fields or in field houses. It is readily portable—can be moved from place to place or left in place indefinitely. Erection is simple, requiring no nuts, bolts, screws or special tools. The stand can be built with any number of rows from 2 to 50, and can be used as a short, high stand or a long, low stand. Supports are steel—seatboards and footboards are made of wood.



**TYPE "BC" OPEN-DECK GRANDSTAND**

This grandstand, like all permanent grandstands, is usually designed to fit the particular needs of the customer. It can be elevated or not, as desired. The type "BC" is built in any number of rows up to 50—is open-deck in construction. Supports are sturdy steel, while seatboards and footboards are made of wood. The steel structure permits expansion, contraction and settlement with absolute safety.



**TYPE "H" PORTABLE GRANDSTAND**

This Wayne Stand is built to give large capacity at low cost. It is furnished, either elevated or not, in any number of rows from 3 to 15. Erection consists of bolting seatboards, footboards and braces to the strong, steel sections. Where rapid erection is desirable the boards can be latched in place instead of bolted. Base angles of the steel construction automatically adjust themselves for uneven ground, eliminating the need for foundations.



**TYPE "BP" STEEL-DECK GRANDSTAND**

The Type "BP", like the Type "BC" is usually designed to individual specifications with the number of rows depending on the customer's desires. It differs from the Type "BC" in that steel plates are used to provide a water-proof stand, under which locker rooms, toilets, etc., can be built. Wooden seatboards are provided and are supported by the steel plates. It can be elevated, if desired, in which case entrance stairs are installed, usually at the front.

**"Wayne Stands for Safety"**

WAYNE IRON WORKS, 544 N. Pembroke Avenue, Wayne, Penna.



THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

## STANDARD ROLLING GYMSTANDS



WAYNE STANDARD ROLLING GYMSTAND AT BALA-CYNWYD JUNIOR HIGH SCHOOL, BALA-CYNWYD, PA.

Wayne Rolling Gymstands are designed to save floor space in the gym by rolling together when not in use. This type of stand is permanently positioned, but does not depend on the wall for stability. When desired, one or more rows can be opened for use while the rest of the rows remain closed, making the stand ideal for use during dances. Made in any number of rows from 3 to 23, the Standard rolling gymstand provides safe, comfortable seating and has a large capacity.



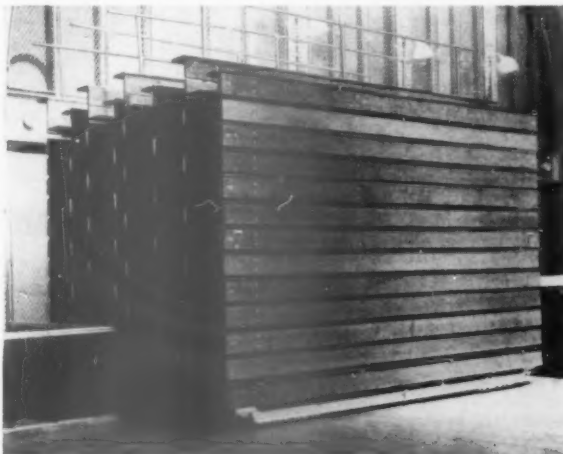
WAYNE STANDARD ROLLING GYMSTAND AT SCOTTSBLUFF SENIOR HIGH SCHOOL, SCOTTSBLUFF, NEBRASKA

## MOVABLE ROLLING GYMSTANDS



WAYNE MOVABLE ROLLING GYMSTAND AT BALA-CYNWYD JUNIOR HIGH SCHOOL, BALA-CYNWYD, PA.

Wayne Movable Rolling Gymstands for indoor use are designed to be moved from place to place on the same floor level. When not in use, these stands roll together to save many square feet of valuable floor space. One man can open or close a stand, quickly and easily. Made in any number of rows from 3 to 14, the stand is moved by means of a pair of two-caster trucks or dollies.



WAYNE MOVABLE ROLLING GYMSTANDS AT U. S. NAVAL ACADEMY, ANNAPOLIS, MD.

## WAYNE STANDS AND SAFETY

In buying or specifying a Wayne Grandstand or Gymstand, you may be sure of one important fact—your installation, whether it be a small, portable stand or a twenty-five thousand seat stadium, is the product of over 31 years of progressive engineering practice devoted to the design, manufacture and erection of grandstand equipment for schools, colleges, municipalities and industrial concerns throughout the country.

And you are assured of absolute safety. All Wayne Grandstands are designed and constructed to conform to the exacting requirements of the Safety Code for

Grandstands (Z20.3) of the American Standards Association, the Grandstand Regulations of the Commonwealth of Pennsylvania and the Standard Specification of the American Institute of Steel Construction. Stresses in wood conform to the recommendations of the United States Forest Products Laboratory. Dead load, live load, sway load and wind load are all provided for with a wide margin of safety.

REMEMBER — any additional information or advice will be gladly given you upon request. Just write to Wayne Iron Works, Wayne, Penna.



WAYNE IRON WORKS, 544 N. Pembroke Avenue, Wayne, Penna.

**"Wayne Stands for Safety"**



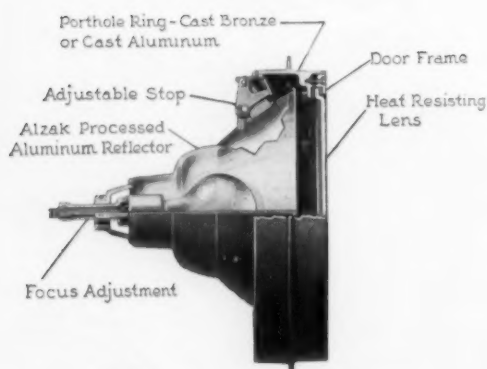
# CROUSE-HINDS COMPANY

Syracuse 1, N. Y.

OFFICES: Birmingham — Boston — Buffalo — Chicago — Cincinnati — Dallas — Denver — Detroit — Houston — Indianapolis — Kansas City — Los Angeles — Milwaukee — Minneapolis — New York — Philadelphia — Pittsburgh — Portland, Ore. — San Francisco — Seattle — St. Louis — Washington. RESIDENT REPRESENTATIVES: Albany — Atlanta — Baltimore — Charlotte — New Orleans — Richmond, Va. — Salt Lake City  
CROUSE-HINDS COMPANY OF CANADA, LTD., TORONTO, ONT.



**TYPE FLA**  
**Sports Floodlight**



**TYPE SPS — Swimming Pool Floodlight**  
**(Sectional View)**

## CROUSE-HINDS NEW Sports Floodlight Gives More Light

Designed especially for sports lighting, Crouse-Hinds' Type FLA has all the latest improvements in floodlight construction, insuring the highest lighting efficiency, easy installation, and most convenient maintenance.

1. The two-piece reflector gives more light.
2. The cast aluminum head and body gives greater strength.
3. The hinged body makes relamping quick and easy and keeps the entire floodlight in a single unit at all times.
4. The extra large opening insures a quicker and better job of cleaning the interior.
5. The floodlight can be tipped over for convenient cleaning of the cover glass and when returned to its original position, a stop insures perfect alignment.
6. The spun-in cover glass is both heat and impact resisting.
7. Degree markings and a built-in sight for accurate aiming save installation time.
8. Crouse-Hinds' high standards of quality and skillful workmanship insure long life.

### SWIMMING POOLS

Type SPS Floodlight is especially designed for the underwater lighting of swimming pools. It can be installed in a passageway around the pool wall or in a small manhole. Type RPS Floodlight is for use where space is limited. Three different types of Crouse-Hinds' floodlights are suitable for the overhead lighting of outdoor swimming pools: Type FLA Sports Floodlight, Type ADE Long Range, or Type GCP Ornamental Lantern Floodlights.

### GENERAL FLOODLIGHTING

Auto parking lots are most efficiently lighted by the use of floodlights. There are many other areas on every campus where it will cost much less to project light to a considerable distance with Crouse-Hinds long range floodlights than to run cables and install local lighting. Often the floodlights can be mounted on buildings, thereby saving the cost of poles or towers.

Crouse-Hinds' latest sports lighting bulletin contains NEMA standard plans for the lighting of baseball, football, and softball fields. Many minor sports are also included. Send for your copy today.



# GENERAL ELECTRIC COMPANY

## APPARATUS DEPARTMENT

Schenectady 5, N. Y.

### *This Floodlighting Increased School Athletic Funds*

**Windber.** A group of Windber, Pa., citizens, including industrial representatives, interested in better community recreation formed the Windber Recreation Association—then built and lighted Windber Stadium. Day or night, its facilities are available to all community groups—from the local industries to the schools.



**Munhall.** Originally Munhall Recreation Park, Munhall, Pa., floodlighted a football field for the local high school team. This proved so popular that additional lights were added for a combination baseball and football field. Now sports fans who are busy working during the day can enjoy their favorite sport at night.



The floodlighting at Windber and Munhall extended the usefulness of the parks by many hours. The revenue from increased attendance at games played "under the lights" pays for the cost of operating the floodlighting system, and the buying of new equipment for the teams.

Windber and Munhall are two more of a fast growing list of progressive municipalities which are making floodlighted recreation fields available to local schools and industries. What is your town doing?

Apparatus Department, Section 640-257,  
General Electric Co., Schenectady 5, N. Y.



**FREE PLANS AVAILABLE**—To help you with the planning of your recreation area, here is a free manual of plans. It's the latest word—plans based on "NEMA-authorized engineering information." Not only lighting plans but lists of materials are included. There are plans for any sport from archery to volley ball—with special sections for football, baseball and softball. Write for Bulletin GET-1284C.

**THE SPORTSLIGHT**—This is the floodlight used at Windber and Munhall, the G-E L-69. It gives more light per unit, more light per watt, is easier to install and cheaper to maintain than any other comparable unit. It's so good that four major-league parks use it, so economical that it's the favorite for sand-lot softball. Bulletin GEC-533 gives complete description and prices.



# GENERAL ELECTRIC

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

**AMERICAN PLAYGROUND DEVICE CO.**  
 World's Leading Manufacturers of the Finest in Outdoor Playground,  
 Swimming Pool and Dressing Room Equipment  
 Anderson, Indiana, U. S. A.



☆☆☆ In Playground Equipment experienced buyers demand durability, absolute safety, proven performance, long service. It is reasonable that only *highest quality* equipment will give you these vitally important features.

## AMERICAN APPROVED Playground Equipment

meets *every one* of your requirements. Modern design . . . top quality materials . . . unexcelled workmanship . . . maximum safety . . . superior performance . . . these are but a few of many *plus-features* you receive when you install pre-war quality *American Approved* Equipment.

☆☆☆ **WRITE TODAY**, please, for Catalogs and descriptive Literature. See why *AMERICAN* has led the field for nearly half a century, why American Approved Equipment outperforms all others.

### **A M E R I C A N** **PLAYGROUND DEVICE CO.** **ANDERSON, INDIANA**

*World's Largest Exclusive Manufacturers of Fine  
 Playground and Swimming Pool Equipment*

SWING SETS • PLAYGROUND SLIDES • SEE-SAW UNITS • HORIZONTAL LADDERS  
 MERRY-GO-ROUNDS • GIANT STRIDES • RUBBER SWING SEATS • PICNIC TABLES  
 BICYCLE RACKS • BASEBALL BACK STOPS • CASTLE TOWERS • PARK SETTEES  
 COMBINATION UNITS • CHAIN LINK TENNIS NETS • HEAVY DUTY REPAIR PARTS





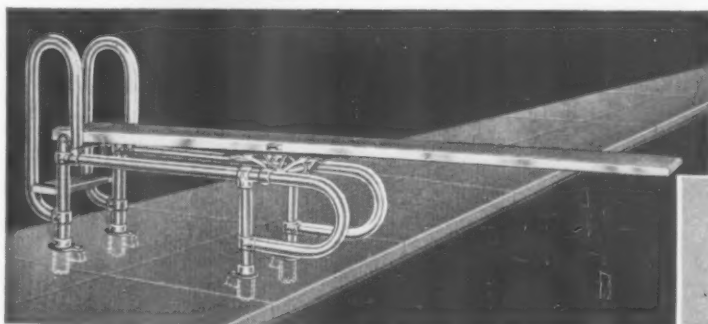
American Approved Castle Tower



An American Approved Combination Unit

All-American Heavy-Duty Uniform Hanger  
For All Athletic Uniforms

An American Official Regulation One-Meter Unit



## *You'll like* DOING BUSINESS WITH AMERICAN

Because safety and long service are prime factors in your choice of Playground and Swimming Pool Equipment, you naturally want the finest that money can buy. Since 1911, the best Approved Equipment has been built by American in Anderson, employing superior materials and craftsmanship.

You'll like American's low, nationally advertised prices also, which today average but 17% above pre-war, just as you will appreciate our friendly, equitable adjustments and American's *Lifetime Guarantee* against defective construction.

Uncompromising high quality, together with a determination to *deserve* your continued goodwill, form our basic policy and make AMERICAN the kind of company with which you'll *like* to do business.

**AMERICAN**  
**PLAYGROUND DEVICE CO.**  
**ANDERSON, INDIANA**

*World's Largest Manufacturers of Fine  
Playground & Swimming Pool Equipment*

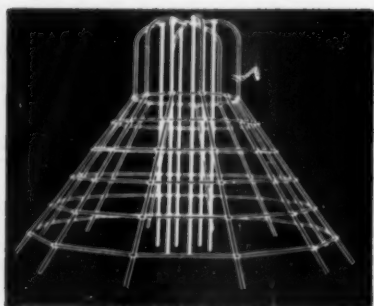
*Write Today* FOR CATALOGS AND SPECIAL LITERATURE  
FEATURING AMERICAN APPROVED

PLAYGROUND EQUIPMENT . . . SWIMMING POOL EQUIPMENT . . . ALL-AMERICAN PICNIC GRILLS  
ALL-AMERICAN UNIFORM HANGERS . . . AMERICAN HEAVY DUTY CHECKING AND GYMNASIUM BASKETS  
STEEL BASKET RACKS . . . AMERICAN REPAIR EQUIPMENT . . . AMERICAN HOME PLAY EQUIPMENT

*Internationally Specified . . . . . Internationally Approved*

# THE J. E. BURKE CO.

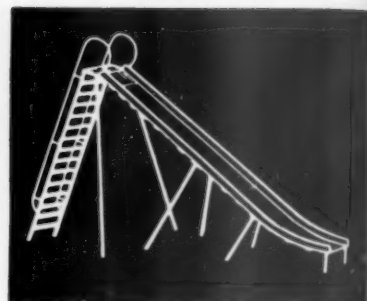
Fond du Lac, Wisconsin



CLIMB-A-ROUNDS



BICYCLE RACK



SLIDES

## BURKE-BUILT PLAYGROUND EQUIPMENT

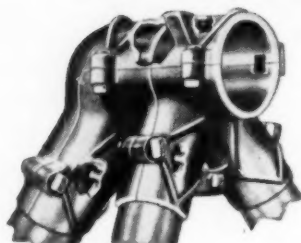
*The favorite for SAFE fun!*

Choose the equipment approved by park and playground officials from coast to coast! Give children, in your care, SAFE wholesome fun and health-building play. Get the full benefit of BURKE experience in design and manufacture . . . strong, sturdy construction, long service, and low maintenance cost. Ask BURKE engineers to assist you, without obligation, in planning a play area.

The Burke-Built line includes: Climb-A-Rounds, Swings, Slides, See-Saws, Merry-Go-Rounds, Turning Bars, Bicycle Racks, Horizontal Ladders and other playground apparatus.

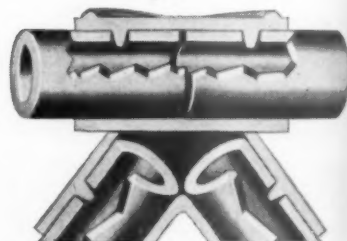
WRITE DEPT U for catalog for full information on playground equipment and replacement parts.

*Galvanized malleable iron fittings make BURKE equipment safer!*



HEAVILY RIBBED reinforcement gives the Certified Malleable iron frame fittings lasting strength at vital points —insures safety.

INTERLOCKING KNOB in split fitting provides safest, most positive construction, PREVENTS twisting, sagging, misalignment.



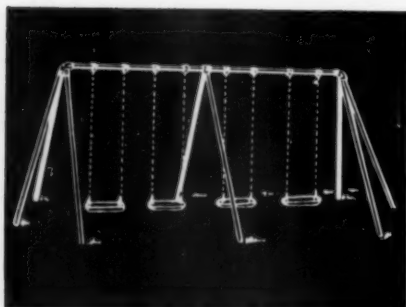
**CHECK YOUR PLAYGROUND EQUIPMENT TODAY!**

Repair and replace equipment now, for children's safety.

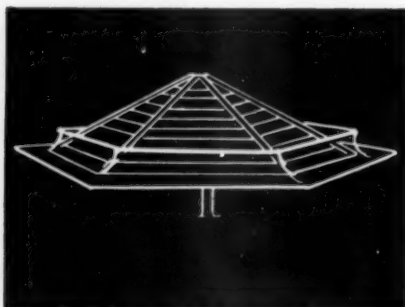
PROMPT DELIVERY OF REPAIR PARTS

**THE J. E. BURKE CO.**

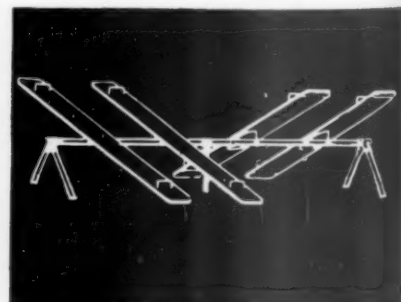
FOND DU LAC, WISCONSIN



SWING SETS



MERRY-GO-ROUNDS



SEE-SAWS

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# GENERAL PLAYGROUND EQUIPMENT INC.

Kokomo, Indiana

## **FUN-FUL** PLAYGROUND AND SWIMMING POOL EQUIPMENT



Climbing Structures

SWINGS

SEESAWS

SLIDES

CLIMBING STRUCTURES

MERRY-GO-ROUNDS

GYMNASIUM EQUIPMENT

BICYCLE RACKS

Swimming Pool Equipment

LADDERS

DIVING TOWERS

DIVING STANDS

DIVING BOARDS

WATER SLIDES

LIFE GUARD CHAIRS

POOL CLEANING EQUIPMENT

### **The HILL-STANDARD LINE**

OUR PLAYGROUND AND SWIMMING POOL APPARATUS HAS BEEN USED BY THE MAJORITY OF THE LEADING PARKS, RECREATIONAL CENTERS, ATHLETIC CLUBS AND Y. M. C. A.'s FOR MANY YEARS. YOU WILL FIND DESCRIBED IN OUR CATALOG THE LARGEST LINE OF PLAYGROUND AND SWIMMING POOL EQUIPMENT MANUFACTURED BY ONE COMPANY

**WRITE FOR CATALOG NOW!**



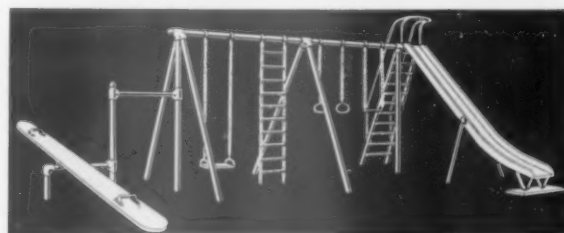
Merry-Go-Rounds



Diving Apparatus



Slides



School Combination No. 670

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



# RECREATION EQUIPMENT CO.

724-26 West Eighth Street, Anderson, Indiana

Manufacturers of Playground, Swimming Pool and Basketball Equipment

**FOR THE PLAYGROUND:** Slides, Swings, Merry-Go-Rounds, Climbing Devices, Gym Combinations, Outdoor Basketball Equipment, Bicycle Racks, Ocean Waves, Shuffleboard Equipment, Flag Poles, etc.

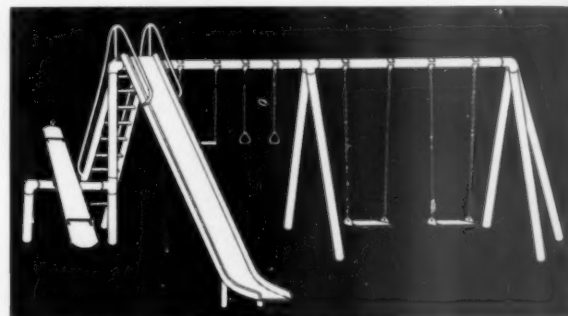
## THE RECREATION LINE

**FOR THE SWIMMING POOL:** Diving Board Outfits, Ladders, Pool Cleaning Equipment, Diving Masks, Foot Trays, Cocoa Matting, Water Slides, Lifelines, Life Buoys, Guard Chairs, etc.

### SPECIFY THE RECREATION LINE



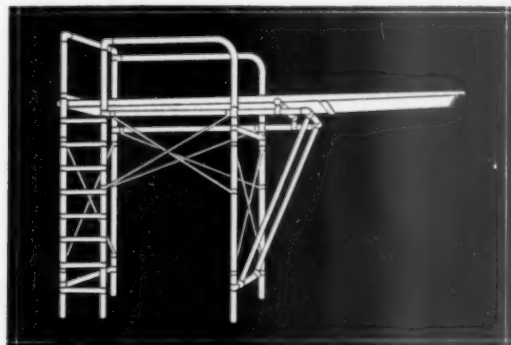
ALL-METAL SLIDES. MANY SIZES



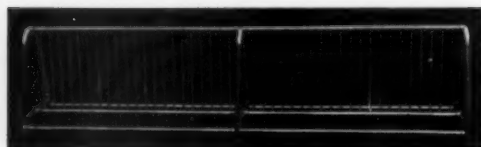
GYM COMBINATION. OTHER COMBINATIONS ALSO



PORTABLE BASKETBALL OUTFIT.  
MANY OTHER TYPES



DIVING BOARD OUTFITS FOR ALL CONDITIONS



BICYCLE RACK DUPLEX AND SINGLE-SIDE



CLIMBING GYM. SEVERAL DESIGNS AND SIZES

## **MAINTENANCE PRODUCTS AND BUSES**

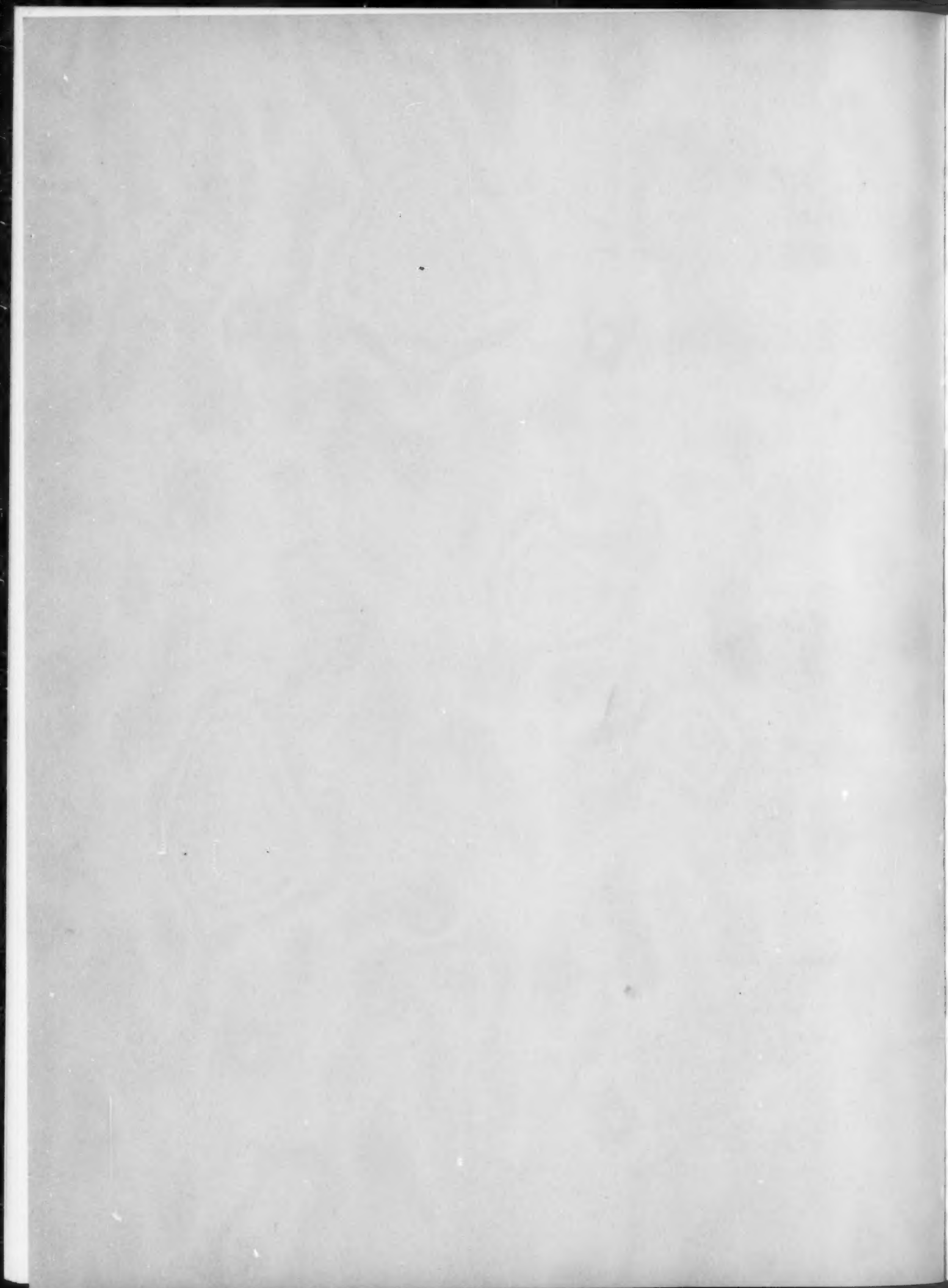
**Floor Machines**  
**Floor Treatments**  
**Vacuum Cleaners**  
**Custodial Supplies**  
**Grounds Maintenance**  
**Lawn Mowers**  
**Tennis Court Surfacing**  
**Fence**  
**School Buses**

Diving  
Cleaning  
Trays,  
lifelines,

ALSO

ONS

ZES





# ADVANCE FLOOR MACHINE COMPANY

2605 Fourth Street S. E., Minneapolis 14, Minnesota

## THE ADVANCE "LOWBOY" ...the Floor Machine that's EASY TO HANDLE

Expertly designed by men thoroughly experienced in all phases of floor maintenance . . . precision-built from the finest materials in our own specialized, modern plant . . . Advance Lowboy floor machines have proved themselves in rugged daily service for more than 20 years. Advance Lowboys polish, scrub, wax, steel wool . . . do a complete maintenance job on every kind of floor, and do not require skilled operators. Only a few inches high, Lowboys slide readily under furniture and equipment—steer as easily as a vacuum cleaner—get close to walls, into corners, around obstacles. They work speedily, quietly, efficiently, economically and are built to give many years of dependable service.

### NOTE THESE ADVANCE FEATURES

Motors (110 v. 60 cycle A.C.) specially wound for extra power and sealed against moisture.

Timken roller bearings for quiet operation.

Tubular steel handle with built-in switch. Handle adjusts instantly to any working position.

Working parts enclosed in sealed, lubricant-packed units.

Patented quick-change brush holders permit use of various brushes.

Adjustable splash guards protect walls and furnishings.

All machines piped for dispensing tank, which is available as optional equipment.

#### LOWBOY 21

Advance's largest model, for heavy duty service and efficient operation on large areas. Twin-disc type—two 3-segment brushes—22 1/2-inch brush spread. 1/2 H.P. motor. Only 6 1/4" high over brushes.

#### LOWBOY 16

Somewhat smaller than Lowboy 21 but similar in design and construction, this twin-disc model is widely used in schools, restaurants, hospitals, public buildings. Shown here with 2 1/2 gallon tank, available on any model. 16-inch brush spread, 1/2 H.P. motor. Only 6 1/4" high over brushes.

#### LOWBOY 15 & 15H

Designed with average-size rooms in mind. Single disc type with 5-segment brush. 15 1/2-inch spread. Only 5 1/4" high over brushes. Lowboy 15 has 1/2 H.P. motor; 15H, 3/4 H.P.

#### LOWBOY 12 & 12H

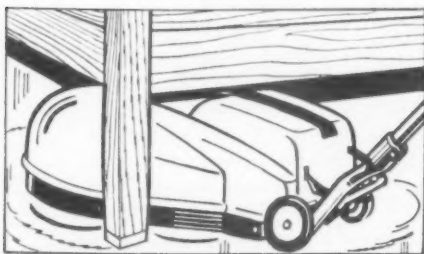
These smallest Lowboys easily get under classroom desks, into restaurant booths, etc. Single disc, 3-segment brush. 13-inch spread. Similar in construction to Lowboy 15. Lowboy 12 has 1/4 H.P. motor; 12H, 1/2 H.P.



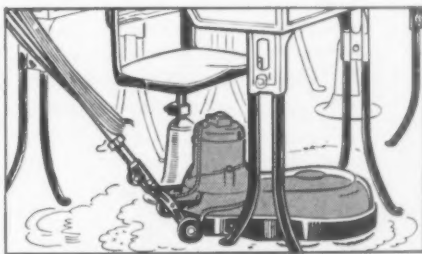
Expertly Designed — Precision-Built

### ... POLISHES • WAXES • SCRUBS • STEEL WOOLS BRUSH ARRANGEMENT (Twin Disc Models)

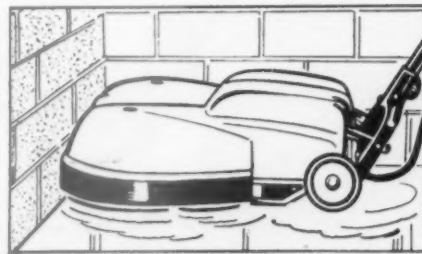
Two 3-segment, intermeshing brushes rotate in opposite directions to eliminate side pull, skidding and lurching. These flexible brushes cover all the floor surface—even the depressions in worn, uneven floors. Quickly interchangeable brush holders permit ready use of different types of brushes, steel wool and buffing pads. Most of the weight rests on brushes; wheels carry just enough weight to assure easy operation.



**UNDER FURNITURE**—Only a few inches high, the Lowboy 16 slides easily under furniture and equipment. To give a longer reach, the handle adjusts instantly to any desired position.



**AROUND OBSTACLES**—Easy to steer as a vacuum cleaner, the Lowboy 12 maneuvers readily around such obstacles as classroom desks and seats. No skidding, lurching, or running away.



**ALONG WALLS**—The Lowboy 16 and 21 models are shaped right for working close up to walls and into corners. No special skill is required to get first-class results in all the jobs they do.

● WRITE FOR FULL INFORMATION and detailed specifications

**ADVANCE FLOOR MACHINE CO.**  
2605 Fourth Street S. E., Minneapolis 14, Minn.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# AMERICAN FLOOR SURFACING MACHINE CO.

518 S. St. Clair St., Toledo, Ohio

## AMERICAN *Deluxe*

### FLOOR MAINTENANCE MACHINE

Ideal for all-around floor maintenance, the AMERICAN Deluxe is adaptable to polishing, scrubbing, scouring, steel-wooling or disc sanding by merely changing the brush or disc as required. Can be operated either as a riding-on-head or a riding-on-wheel unit, handle adjustable.



EASY TO STORE!

EASY TO OPERATE!

#### AVAILABLE IN 3 DISC MODELS

##### 19-INCH De Luxe

Construction: Cast Aluminum Alloy, highly buffed and polished. Brush Dia.: 19 in. Motor:  $\frac{3}{4}$  H.P. A.C., 110-220 volt, 60 cycle. Weight: 122 lbs.

##### 16-INCH De Luxe

Construction: Cast Aluminum Alloy, highly buffed and polished. Brush Dia.: 16 in. Motor:  $\frac{1}{2}$  H.P. A.C., 110-220 volt, 60 cycle. Weight: 93 lbs.

##### 14-INCH De Luxe

Construction: Cast Aluminum Alloy, highly buffed and polished. Brush Dia.: 14 in. Motor:  $\frac{1}{3}$  H.P. A.C., 110 volt (single voltage only). 220 volt motor also available. Weight: 58 lbs.

#### AMERICAN STANDARD FLOOR SANDERS

(Not illustrated). Made in two sizes 8" width Sanding Drum, with heavy duty  $1\frac{1}{2}$  H.P. Motor, 1600 R.P.M. 12" width Sanding Drum with 2 H.P. Motor, 2000 R.P.M. Details on request.



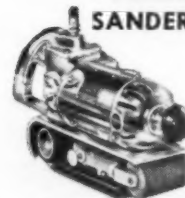
A silent running machine constructed low enough for use under desks, beds and other furniture for elimination of all extra hand work. Construction Features include Adjustable Steering Handle, Brush Leveling Device, Extra Wide Rubber Bumper, 18 in. Sectional Brush, Full Ball Bearing 1 H.P. Electric Motor.

#### AMERICAN SPEEDY SPINNER

An all around portable sander complete in itself. For smoothing surfaces on wood, metal, plastic, glass, marble, etc. . . with ten times the speed of hand work. Has  $5\frac{1}{2}$ " sanding disc with speed of 1200 R.P.M. Cast Aluminum alloy construction.  $9\frac{1}{4}$ " long, 4" wide, 6" high. Weighs 5 lbs. 10 oz.



#### AMERICAN SANDERPLANE



An electrically-driven Belt Sander for all wood, metal, stone and marble sanding. Does work of four hand planes. Made in Two Models: Model No. 3 complete with built-in dust collecting system. Model No. 2, same as No. 3 except without dust collecting system. Abrasive Belt is 3" x 25" long with speed of 1500 F.P.M.

# BREUER ELECTRIC MFG. CO.

5116 Ravenswood Avenue, Chicago 40, Ill.

## **TORNADO\* COMPANION CLEANERS** for Complete School Maintenance

### NEW All-Purpose Floor Machine

Designed for operator satisfaction. Proper balance provides "feather-touch" control to make it the smoothest, easiest operating floor machine available. TORNADO'S "glideaway" action reduces operator fatigue to a minimum. As a result, work is accomplished more thoroughly in less time. Incorporates all those features operators have found necessary for complete floor maintenance.



Scrubs, waxes, polishes and buffs wood, asphalt or rubber tile and linoleum floors. Scrubs and removes stains from terrazzo, concrete, ceramic tile and marble floors. Shampoos carpets and rugs on floors.

Available in brush diameters of 12-14-16 and 18 inches to fit your individual needs. Approved by Underwriters Laboratories.

Write for free copy of "The TORNADO\* Method". Contains recommendations and standard practices for proper floor care.

## **TORNADO\* One-Stroke Commercial VACUUM CLEANER**

Your housekeepers, janitors and maintenance people will appreciate the extra suction and power the TORNADO\* delivers. No further need to restroke an area over and over again to obtain results. The TORNADO\* does the job thoroughly the first time over. Saves cleaning time. Does a better job. Far more powerful than any domestic cleaner, yet light in weight, easily carried and handled.

Horsepower for horsepower, no greater suction has ever been obtained in a commercial vacuum cleaner than in the TORNADO\*.

**Easy to Operate.** Free rotating intake and nozzle swivels permit flexible, maneuverable operation. Unique design catches lighter dust and dirt in bag; heavier material goes directly into tank. Light weight attachments for special cleaning applications. Cleans carpeted and bare floors, walls, blinds, drapery, upholstery quickly, safely, thoroughly. As a furnace cleaner it has no equal. Adds years of life to floor coverings because it removes the grit that cuts the fibre.

**Wet and Dry Pick-Up.** Draws up water, moist substances and all liquids without machine adjustments. Operator moves right along, removing all wet or dry materials as they come. Used as a companion cleaner with the TORNADO\* Floor Machine when scrubbing, it instantly removes excess water and moist scraps. Leaves a clean, dry, safe surface.

**Versatile.** TORNADO\* Vacuum Cleaners have a removable motor unit which becomes a high-velocity blower. Shoots a concentrated stream of clean, dry air to blow dirt and grit from interiors of motors and shaftings; from radiators, grills, ducts and similar hard-to-reach places. Same power unit serves as a pack-carried vacuum cleaner for cleaning stairways, storerooms, etc. Blower may be further converted into a powerful insecticide sprayer which shoots a fine spray to distances of 60 feet.

**2 Sizes.** Available with 1 H.P. and 1 1/3 H.P. universal air-cooled motors with 10-gallon and 12-gallon steel tank. Tanks attractively finished in baked-on maroon enamel. All components and fittings are of light-weight aluminum castings. Both models approved by Underwriters' Laboratories.

Bulletin 592 contains complete information





# CLARKE SANDING MACHINE COMPANY

47 Clay Avenue

Muskegon, Michigan

SALES AND SERVICE BRANCHES IN ALL PRINCIPAL CITIES

## FOR EASY, LOW-COST FLOOR CARE

...there's nothing like a

# Clarke!

### CLARKE FLOOR MAINTAINER

Scrubs, waxes, polishes, steel wools, sands all floors, shampoos all carpeted areas. Is easily maneuverable in "tight quarters"; operates under desks, chairs and other low-type furniture. All models equipped with "finger-tip" control safety switch. Rugged construction, perfect balance, quiet operation and dependable year-after-year performance. Adjustable handles available to fit operator. Comes in 4 sizes. Approved by Underwriters' Laboratories.

Ask for free demonstration on your own floors! Sales and service branches in all principal cities.



**P-23**  
Brush diameter 23"  
Brush speed 141 rpm  
Motor 1 hp  
Weight 134 lbs

**P-17**  
Brush diameter 17"  
Brush speed 169 rpm  
Motor 3/4 hp  
Weight 115 lbs

**P-15**  
Brush diameter 15"  
Brush speed 169 rpm  
Motor 1/2 hp  
Weight 96 lbs

**P-13**  
Brush diameter 13"  
Brush speed 169 rpm  
Motor 1/2 hp  
Weight 76 lbs



### CLARKE HURRIKLEEN ELECTRIC MOPPER

Where large areas are to be scrubbed, the NEW Hurrikleen Mopper will do the work of ten men with ordinary mops! Scrub water picked up instantly — floors are dry in seconds.

#### Specifications:

Motor: 1 hp Universal type, by pass moisture proof, 110/115 volts, AC-DC.

Capacity: 15 gal., 18 gauge steel. Dimensions: Squeegee width — 30 inches, width overall — 31 inches, length overall — 34 inches, cable holder adjustable to 7 feet.

Net Weight: 104 lbs.

Finish: Waterproof porcelain interior — outside heat treated lacquer.

### CLARKE HEAVY DUTY, PORTABLE, WET AND DRY VACUUM CLEANER



MODEL WD-20

For ALL floor care — wherever water, dirt and dust must be picked up! Four ball bearing swivel casters. Powerful suction from 1 hp motor and 3-stage turbine. Light neoprene hose, flexible, easy to handle. Handy dump valve for quick draining, eliminates heavy lifting.

#### Specifications:

Motor: 1 hp Universal, 110/115 volts, AC-DC.

Hose: Neoprene, 9 ft. long, 1 1/2 inches in diameter.

Capacity: 15 gal.

Net Weight: 53 lbs.

Finish: Vinylite finish inside — durable baked finish outside.

### FOR SMALLER AREAS — A COMPANION HEAVY DUTY VACUUM — THE CLARKE MODEL WD-7

With the same quality features as the above model, but smaller in size.

#### Specifications:

Motor: 1/2 hp Universal type, 110/115 volts, AC-DC.

Hose: Neoprene, 7 ft. long, 1 1/2 inches in diameter.

Capacity: 5 gal.

Net Weight: 35 lbs.

### CLARKE FLOOR SANDER

Has surface speed of 3,200 feet per minute. Balanced to insure smooth sanding. 1 1/2 hp motor drives 7 1/2 diameter drum at 1,650 rpm. In 3 sizes.



### CLARKE DUO SANDER-POLISHER

For refinishing and polishing desks, blackboards, lockers, sanding playground equipment. For school shop use. Light, powerful, portable. AC or DC. Approved by Underwriters' Laboratories.

Ask for catalog sheet listing all accessories.



### CLARKE EDGER

Indispensable for stair treads, landings, closets, narrow corners. Headlight for use in dark corners. Dustless operation.



**Clarke** SANDING MACHINE COMPANY  
470 Clay Avenue Muskegon, Michigan

Write for prices and descriptive literature

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# CONSOLIDATED LABORATORIES

SOUTH VANDEVENTER AT HUNT AVE., ST. LOUIS 10, MO.

**YOU CAN COUNT ON "CON-SOL" QUALITY FOR ALL SCHOOL NEEDS**



## GYM FLOORS

*Proven 1-2-3 Treatment*

### PERMA-SEAL

**1.** Tremendous, almost unbelievable penetrating power. PERMA-SEAL's satin-like sheen defies every known enemy of beautiful floors—acids, abrasive grime, dirt, etc. This scientific seal is as close to permanent protection as possible. It strengthens! It seals! It beautifies! . . . and it's economical.

### PERMA-GYM-SEAL

**2.** The last word in fine gymnasium finish. Coaches, players, spectators, alike prefer this new improved finish that properly deflects light, and adds to the enjoyment of every activity. Transparent, crystal-like surface gives fast-start, quick-stop play every minute. Will not crack, check or break up under tested impacts of hundreds of pounds.

### SKIDPROOF\*

**3.** The only known, practical protection for gym seals and finishes . . . cuts maintenance time and costs in half. Created and perfected after years of research, this waxless product removes the dangers of slips and falls—speeds up play—enhances the beauty of every sealed floor. Takes wear and tear of dances, meetings, sports events in stride. Traffic impact, scraping chairs and shoes cannot penetrate to the seal itself. Easy-to-apply and maintain.

For extra-heavy duty protection of classroom floors . . .

### ... PERMA-SEAL IS PERFECT

Clean, safe, sanitary PERMA-SEALED floors meet the wear challenge of thousands of pairs of busy, scuffling feet. No surface film to scratch, or disfigure—just a soft, satin-sheen glow that stands up day after day with a minimum of care.

PERMA-SEAL can't wear off—it's part of the wood itself!

*Write for Con-Sol Catalog*

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



**FOR EVERY CLEANING AND MAINTENANCE TASK THERE IS A LABORATORY-TESTED, SERVICE-PROVED Con-Sol PRODUCT**

- **PERMA-COLOR SEAL**—for beautifying and sealing concrete, stadium seats and other hard-to-maintain inside and outside surfaces. Weather resistant!
- **SANA-SASS**—neutral, liquid chemical cleaner. Extraordinary replacement for harsh soaps and powders. Cleans all fine surfaces by gentle but effective, positive action.
- **INSTANT PASTE CLEANER**—for porcelain and vitreous material. No scratch—no dusty powder—no waste!
- **RAZZO SEAL**—especially for hard tile and terrazzo.
- **KWIK-FLO SEAL**—clear penetrating seal for wood—concrete. Dries hard and bright in 3½ hours.
- **KWIK-FLO FINISH**—clear—transparent surface finish. Companion product to KWIK-FLO SEAL. Dries in 4½ hours.
- **SOAPS**—Laundry—Liquid Hand.
- **DISINFECTANTS**—Steam distilled Pine Oil. Synthetic phenol in mint, lilac, pine or odorless.
- **DEODORANTS**—Block—disc—powder.
- **RENOVET**—spray deodorant, removes all odors from the air in stuffy rooms, offices, gymnasiums, lavatories and other areas in a matter of moments. Different in action and in results. Attacks and kills odors at their source—does not merely mask them. Simple to use in ordinary hand sprayer.
- **INSECTICIDES**—Liquid—powder—odorless.
- **INSECTROL**—odorless, tasteless, perfectly safe to use in and around food. Approved for use in Government inspected packing houses. Effective!
- **SKIDPROOF**—Outstandingly successful for non-slip protection and beautification of asphalt tile, linoleum, cork, rubber and all other surfaces. Guaranteed safe and harmless. Outwears wax type products 3 to 1! Does not build up or show laps. Easy to maintain. 1 gallon covers 2,000 square feet.

**Complete Line of Electric  
Polishers . . . Scrubbers . . . Vacuum Pickups**



# THE EMPIRE VARNISH COMPANY

## WATERLOX DIVISION

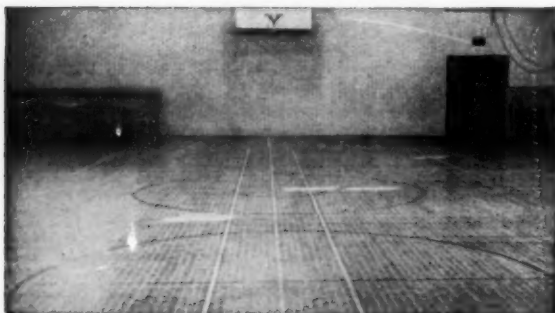
2638 East 76th Street, Cleveland 4, Ohio

### WATERLOX PRODUCTS

— Made from Tung Oil —

Waterlox Transparent  
Heavy Duty Gym Finish  
Heavy Duty Floor Seal and Finish  
Waterlox Cement Floor Stain  
Waterlox Flat Coat  
Waterlox Hades Aluminum

### A New and Better Finish for Gym Floors



### WATERLOX

#### Heavy Duty Gym Finish

A new, high quality gymnasium floor finish made with a tung oil base. Waterlox Heavy Duty Gym Finish dries quickly and provides a beautiful, hard durable surface. This finish is easily cleaned as it resists alcohol and alkali cleaners and ink, rubber marks, and other dirt are quickly removed. It conforms to the rigid specifications of the Maple Flooring Manufacturers Association, too.

### WATERLOX

#### Heavy Duty Floor Seal and Finish

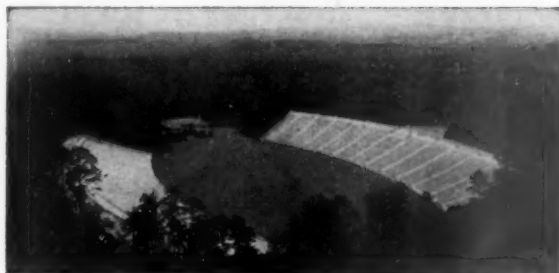
A penetrating seal and finish for heavily travelled wood floors. It, also, has a tung oil base and dries to a beautiful, hard surface quickly. It provides moisture control and, resistance to alcohol and alkali, makes the floor easy to maintain. Approved by the Maple Flooring Manufacturers Association.

#### Furniture and Desks

Waterlox Transparent is the ideal finish for furniture and desks, particularly if they are subject to moisture or other liquids, as in laboratories. A lasting coating which can be developed to as high a gloss as desirable.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

### The Stadium



The preservation and maintenance of an expensive stadium can be accomplished best by the use of Waterlox Transparent, made with a tung oil base. Cracks, hair-checking and crumbling from varying weather conditions are controlled by a coating of Waterlox Transparent and one of the other materials to provide the type of surface desired. Directions are available for wood, metal or cement from the makers of Waterlox.

### SPECIFICATIONS

Directions or an answer to your particular problem concerning moisture control, masonry sealing, coating asphaltum or mastic tile floors, and other surfaces can be obtained from the address shown in the heading. Technical assistance is yours for the asking.

### WATERLOX CEMENT FLOOR STAIN

Appearance, durability and economy are combined in Waterlox Cement Floor Stain to give you the most for your money. It is a finished blend of Waterlox Transparent and a skillfully developed pigment. It is not a dye and not a paint, but it has all the hiding qualities of the best cement floor paints, and an endurance beyond that of other coatings. It virtually locks itself into the porous surface of concrete, metal, or wood, resulting in a smooth, even surface of lasting color.

Waterlox Cement Floor Stain comes in bright, gay colors that make a cement-floored room sparkling and livable. It is an excellent coating for wax-free linoleum, and rejuvenates worn wood surfaces most successfully. It is also a beautiful trim for metal and tile roofs and spouting.



### — DESCRIPTIVE FOLDERS —

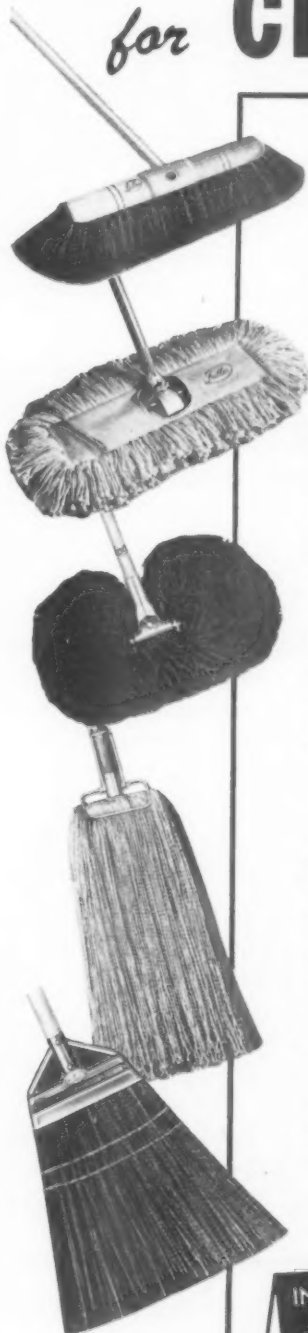
"FLOOR MAINTENANCE" • "USES AND FACTS"  
"CEMENT FLOOR STAIN" • "MASONRY SEALING"



# THE FULLER BRUSH COMPANY

3566 Main Street  
Hartford 2, Conn.

## ALL THE TOOLS *for* **CLEANING SCHOOLS**



### FLOOR BRUSHES

Brush materials include bristle, nylon, bristrand, horsehair, and various combinations of fiber. 12" to 36" widths. Full, firm sweeping surfaces that wear down evenly. Solid hardwood blocks.

### LAUNDERABLE SWEEPING MOP

Fully washable, 4-ply cotton yarn with long trim. All in one piece. Sanforized canvas backing... easy to replace. Zipper opening does away with tape ties. In widths from 12" to 48".

### DRY MOPS

Three sizes — 36" x 12", 18" x 11", 12" x 8½". Washable. Swivel action permits both sides to be used.

### WET MOPS

Maximum absorbency, easy rinsing, long wearing. Three types of construction — narrow tape, wide tape, solid head in 12, 16, 20, 24, and 32 ounce weights. Made of 4 ply, 9 ply and 30 ply long staple cotton yarns.

### FIBER BROOMS

Long-wearing fibers, set in metal case, wear down evenly...do not heel over...are not affected by water.



### BENCH BRUSHES

Wood back or Fullergript construction. Made in a wide variety of materials including bristle, horsehair, fiber, bristrand and various mixtures.



### WAXES & POLISHES

Floor waxes, either paste or liquid, to protect and beautify your floors. Require less cleaner — less work — less time. Also furniture polish and metal polish.



### PAINT BRUSHES

For every painting and varnishing job — 100% pure bristle and 100% nylon brushes.



*Also:* cotton dusters, scrub brushes, toilet brushes, test tube brushes, bottle brushes, tumbler brushes, window brushes, venetian blind brushes, radiator brushes, wall brushes, squeegees (floor and window), wax applicators, and All Purpose cleaner.

INDUSTRIAL DIVISION  
**The FULLER  
BRUSH COMPANY**

3566 Main Street  
HARTFORD 2, CONN.

FOR INFORMATION  
WRITE TO . . .

ATLANTA, GA., LOS ANGELES, CALIF., DALLAS, TEXAS, HAMMOND, IND.  
OAKLAND, CALIF., ST. PAUL, MINN., SEATTLE, WASH., TOLEDO, OHIO

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# HILLYARD

St. Joseph, Missouri

BRANCH OFFICES AND WAREHOUSE STOCKS IN PRINCIPAL CITIES

## FAST-ACTION HILLYARD FLOOR PRODUCTS—OFFER SCHOOL PLANNERS THE MOST FOR THEIR FLOORING DOLLARS!



BOARD OF EDUCATION, PORT BYRON, N. Y.

FOR CLEANING TRAFFIC-WEARY FLOORS  
AND CORRIDORS CHOOSE

### **Super SHINE® ALL**

Try Hillyard Super Shine-All . . . the all-purpose neutral chemical cleaner that cleans and preserves in 1 easy application. Requires no rinsing. Cuts labor time in half. Safe on all types of floors, painted or varnished surfaces. Endorsed by flooring contractors, manufacturers, school maintenance men. U/L approved.



HIGH SCHOOL, WATERVLIET, N. Y.

FOR SEALING WORN AND POROUS TERRAZZO  
OR CEMENT USE

### **ONEX® SEAL**

Hillyard Onex-Seal gives real floor protection and low-cost daily maintenance. Onex-Seal penetrates into the pores of the floor and sets up hard. Makes dull unattractive school floors look like new. Easy to apply . . . easy to maintain . . . just damp mop with Super Shine-All occasionally.

FOR RENEWING CLASSROOM FLOORS  
TREAT WITH

### **Hilco-Lustre®**

Treat floors with safe, slip-resistant Hilco-Lustre. Not a wax, but a self-polishing renewer. Makes floors glossy, beautiful once again. Dries in less than 30 minutes. Needs no buffing or polishing. Suitable for all types of resilient school floors. U/L approved as "anti-slip."



BOYS' HOME, MOBILE, ALA.

SEND FOR YOUR NEW HILLYARD  
FULL INFORMATION ON HILLYARD  
TREATMENTS, MAINTENANCE

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# HILLYARD

St. Joseph, Missouri

BRANCH OFFICES AND WAREHOUSE STOCKS IN PRINCIPAL CITIES

**...and HILLYARD MAINTAINERS are always "on the job" to give FREE advice, help on any Floor Problem**

FOR REFINISHING GYM FLOORS  
HILLYARD RECOMMENDS

## STAR<sup>®</sup> Gym Finish

Hillyard created Star Gym Finish especially for gym floors. Star Gym is the No. 1 choice of physical directors, coaches and school men throughout the continent and is used on more than 15,000 gyms. Star Gym is easy to apply and produces a tough, no-glare non-skid surface for safe action play.



ROOSEVELT HIGH SCHOOL GYM, PORT ANGELES, WASH.

## FOR LOW COST CLEAN-UP

FOR REMOVING OLD VARNISH AND  
PAINT APPLY

## KURL-OFF<sup>®</sup>

Hillyard Kurl-Off is a non-inflammable, non-explosive remover. Zips off old finishes and paint with ease. Completely safe . . . works when other removers fail. Ideal for refinishing school desks, traffic-worn floors or woodwork in hallways, lunchrooms, classrooms, libraries.

FOR DAILY MAINTENANCE OF FURNITURE,  
FLOORS AND WOODWORK, DUST WITH

## Super HIL-Tone<sup>®</sup>

Sweep with Hillyard Automatic Dustless Floor Brush moistened with HIL-TONE dressing. Scientifically formulated Hil-Tone holds down germ-laden dust, keeps floors and woodwork looking bright, clean and attractive and maintains a non-slip surface. Successfully used on thousands of school floors. Unsurpassed for woodwork and furniture. Keeps lockers looking their best.



LIBRARY, FREDONIA, N. Y.

### TO SAVE LABOR TIME . . .

Hillyard Dry-Cleaning, dustless STEELTONIAN MACHINE answers the maintenance headache. (1 man and 1 machine can prepare 3,000 sq. ft. of flooring in 1 hr.) 10 in., 16 in. sizes. Also used for wet cleaning, honing, sealing.

### TO SPEED MAINTENANCE . . .

Hillyard HILTONIAN, the twin-brush underslung combination scrubbing and polishing machine, coordinates speed, power and weight. Covers large school areas quickly. Sizes 16, 19 and 22 inch.

### FOR FREE ADVICE ON ANY SCHOOL FLOOR PROBLEM

Ask the Hillyard Maintainer in your locality. He is a floor treatment expert . . . will show you the correct Hillyard product for every job . . . and the economical way to use it.

**FREE—Hillyard Job Specification Folder. Ask your Maintainer.**



YARD CATALOG . . . FREE ON REQUEST . . .  
HILLYARD'S COMPLETE LINE OF FLOOR  
FINISHES AND SANITATION PRODUCTS



# GENERAL FLOORCRAFT, Inc.

333 Avenue of the Americas, New York 14, N. Y.

## BIG SAVINGS IN FLOOR MAINTENANCE WITH

# General

HEAVY DUTY FLOOR MACHINES  
Keep ALL Floors Clean and Safe

Put one of our four star Generals to work on your floors, sit back and smile. Here's why—

1. SAFETY! **GENERAL** keeps floors hospital clean at all times, eliminates floor hazards.
2. SPEED! **GENERAL** lets one man do the work of four; does it better in less time.
3. VALUE! **GENERAL** keeps floors always "new". Adds years to their life.
4. LOW COST! **GENERAL** is tough—works long hours; never gets tired; needs no vacation.
5. ALL PURPOSE! **GENERAL** does everything—SCRUBS, WAXES, POLISHES, BUFFS, DRY CLEANS, sands, refinishes, dry scrubs all types of floors. Also shampoos rugs.

Know-How plus experience built into every GENERAL account for the outstanding superiority of these amazing machines. Money can't buy a better floor conditioner—yet GENERALS cost no more.

Like a demonstration on your floor? Just write, phone or wire us and we'll arrange it through an authorized GENERAL dealer. No obligation, of course. Let's go!

### USED FROM COAST TO COAST IN LEADING

Schools	Stores
Hospitals	Office Buildings
Churches	Factories
Institutions	Lofts

Ask about the General T-12 Household Model for the home.



## GENERAL FLOORCRAFT, Inc.

333 Avenue of the Americas, New York 14, N. Y.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



# THE KENT COMPANY, INC.

174 Canal Street, Rome, N. Y.

## The **KENT** Quiet Triple-Power Vacuum Cleaner

### SOLVES YOUR CLEANING PROBLEMS!

★ FOR WET PICK-UP

★ FOR DRY PICK-UP



Here at last is a quiet machine engineered to produce a high vacuum and a high air movement (195 cubic feet of air per minute) . . . yet it barely whispers while it works! In comparing specifications on vacuum cleaners, check the amount of vacuum produced with the orifice open as well as closed—you may be surprised at the results!

### It runs so quietly you can use it during school hours

Clean your halls while the school is in session . . . or clean vacant class-rooms while neighboring ones are in use . . . you won't disturb the students!



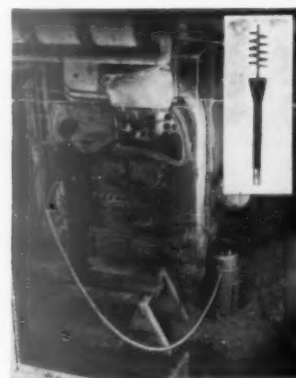
#### Used with Kent Floor Machine as a quiet Fast Cleaning Team

Your KENT Quiet Triple-Power Vacuum Cleaner follows your KENT Floor Machine to pick up dirty scrub water (even from cracks and crevices) and dry the floors in one quick operation!



#### Saves time, does more efficient job in school classrooms and corridors

You don't have to wait until school is out to start your cleaning—the KENT Quiet Triple-Power Vacuum Cleaner won't disturb the students, . . . works thoroughly, quickly, quietly. Even erasers can be cleaned without removing them from the rooms!



#### Does a neat, thorough job of cleaning boiler flues

Used with special brush attachment shown in the insert the quiet KENT cleans flues quickly . . . saves up to 20% of your fuel bill when used regularly.

CLEAN WITH

# KENT

EQUIPMENT

# LINCOLN-SCHLUETER FLOOR-MACHINERY COMPANY

1234 West Van Buren Street, Chicago 7, Ill.

**COMPLETE LOW-COST FLOOR MAINTENANCE**  
and Refinishing Made Easy With These Sturdy, Efficient, Time-Saving Machines



**LINCOLN SINGLE DISC  
SCRUBBERS AND POLISHERS**

These famous heavy duty scrubbers and polishers come in 5 sizes according to brush spreads. SD-012, SD-116, SD-119, SD-121. Finely balanced for easy control, quiet. Handle adjustable to height of operator.



**NEW — LINCOLN V-15  
WET OR DRY PICKUP VACUUM MACHINE**

This powerful portable vacuum machine picks up dirty scrub water, leaves floor absolutely clean. Saves the time usually spent waiting for floor to dry before waxing. Also used when shampooing rugs to remove lather, moisture and dirt. Even more useful for dusting floors, walls, mouldings, overhead pipes, machinery. In short, complete dust control throughout school buildings. 1) easy-to-change accessories including one for clearing stopped up drains and sinks. QUIET in operation.



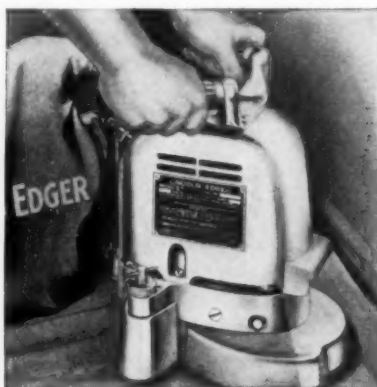
**LINCOLN SINGLE DISC RUG  
AND FLOOR SCRUBBERS**

Single disc machines with solution tanks on handles for easy efficient use of shampoo or detergent. Aluminum backed, split-feed brushes for shampooing rugs or scrubbing floors. A change of brushes makes it a polisher also. Three sizes; RS-012, RS-115, RS-118.



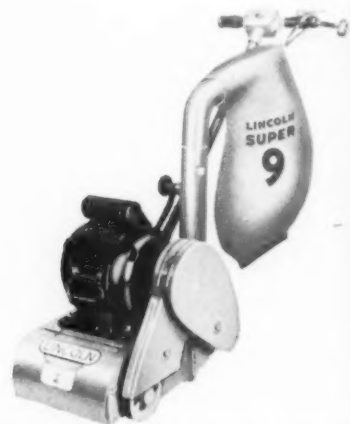
**LINCOLN TWIN DISC  
SCRUBBERS AND POLISHERS**

Ideal for smaller schools and places where older men or women do the work. Available in two sizes, N-132 with a brush spread of 16 inches and N-121 with 21-inch span. High Lincoln Quality.



**LINCOLN E-7  
TWIN-MOTORED EDGER**

This necessity for completing floor sanding jobs finishes them right up to baseboards. Has twin motors, one for sanding disc, the other for vacuuming up dust. Sanding discs removable by hand; no wrench needed.



**LINCOLN LINE OF FLOOR SANDERS**

Extra rugged construction and sizes to suit any type job. Lincoln Drum type sanders come in 7, 8, 9, 12 and 15-inch sizes. Completely dustless operation. Let us recommend type best suited to your school.

**REPRESENTATIVES IN ALL PRINCIPAL CITIES — WRITE FOR COMPLETE INFORMATION AND NAME OF NEAREST FACTORY DEALER**



**Lincoln-Schlueter**  
FLOOR MACHINERY COMPANY  
1234 WEST VAN BUREN ST., CHICAGO 7 ILLINOIS

World's Manufacturer of the Most Complete Line of Floor Maintenance Equipment



THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



# PORTER-CABLE MACHINE COMPANY

3180 No. Salina Street, Syracuse 8, N. Y.



TYPE BB-10 (with dustbag)

## PORTER-CABLE *Speedmatic* SANDERS

Remove old varnish and other surface finishing. Sand right down to the grain—no costly, inflammable removers. Faster than 10 pairs of hands. Ideal for refinishing desks, blackboards, chair arms, cabinets—for fitting screens, storm sash, doors. Models for all uses including orbital motion Speedmatic-Sterling 1000.

Model No.	Belt Size	Price
A-2 (Guild)	2" x 21"	\$ 59.50
A-3	3" x 24"	107.00
BB-10	3" x 27"	150.00
500	4" x 27"	165.00
Sterling 1000	3 3/4" x 9" pad	115.00



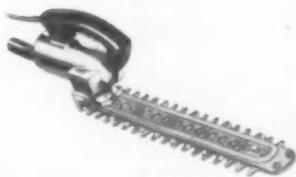
## PORTER-CABLE *Speedmatic* SAWS

These are the balanced power saws, designed for easy, safe, one-hand use. Thumb screw adjustment for angle and depth of cut. Broad base prevents tilting and veering and rests saw firmly on work after cut-off has been made.

In-line helical drive delivers much more power to the blade and prevents wrist twist and torque strains. Porter-Cable saws greatly speed up cutting and fitting in carpentry and maintenance work... are adaptable for use on Model ERA Radial Arm.

Porter-Cable Saw Tables are available for use with certain Speedmatic and Guild Saws.

Model No.	Max. Depth of Cut	Price
A-4 (Guild)	1 1/4"	\$ 49.50
A-6 (Guild)	2"	65.00
A-8 (Guild)	2 7/8"	87.00
K-75	2 1/4"	120.00
K-89	2 3/4"	130.00
BK-10	3 3/4"	175.00
BK-12	4 3/8"	215.00
ERA (Radial Arm)		190.00



## Guild HEDGESHEAR

Cuts growth up to 1/2" thick. Endless-chain cutting links cut smoothly on both sides of cutter bar. Perfect balance, no vibration, no fatigue. \$44.50.

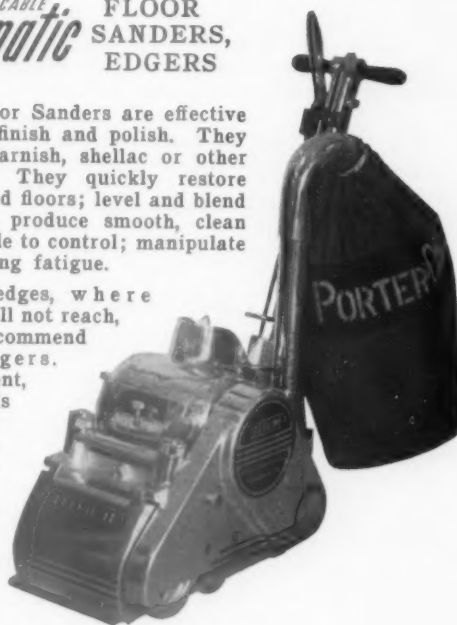
SEE PORTER-CABLE PAGE IN SHOP SECTION OF THIS ISSUE FOR OTHER USEFUL MACHINES. WRITE DIRECTLY TO PORTER-CABLE FOR DETAILED LITERATURE ON ANY OF THE TOOLS SHOWN HERE

## PORTER-CABLE *Speedmatic* FLOOR SANDERS, EDGERS

Speedmatic Floor Sanders are effective for rough-cut, finish and polish. They remove hard varnish, shellac or other floor finishes. They quickly restore worn and scuffed floors; level and blend patches. They produce smooth, clean work; are simple to control; manipulate without operating fatigue.

For finishing edges, where floor sanders will not reach, we highly recommend Speedmatic Edgers.

These efficient, easy-to-use tools blend finished edges with main floor surface perfectly. Equipped with shielded electric light, easy-grip handles, quick-change abrasive discs. 3 models available for various needs.



### FLOOR SANDERS

Model No.	Width of Cut	Price
F-89	8"	\$385.00
F-10	10"	485.00
CF-12	12"	510.00



## Guild COMBO-TOOL

Sands wood, grinds metal, stone, plastic, glass—drills, polishes, cuts, mixes, buffs, etc. Motor has extra power. Takes standard chuck for all 1/4" attachments. Tool alone — \$44.50;

with handy shop accessory kit — \$69.50.

## PORTER-CABLE *Speedmatic* ROUTER

Safe, dependable, gives professional results on all routing jobs. Quick, accurate, uniform—no shaft distortion—simple micrometer adjustment. With motor — \$125.00; base only — \$36.00.



## PORTER-CABLE *Speedmatic* PLANE

Levels down stock, planes accurate, glass-smooth edges for joints or finished work. With motor — \$175.00; attachment only — \$86.00.

## PORTER-CABLE *Speedmatic* SHAPER

Uses inverted router attached to bottom of table. Makes shaping quick and easy. Complete with pedestal and router — \$225.00; table and pedestal only — \$100.00; shaper table with router — \$192.00.

# WEST DISINFECTING COMPANY

42-16 West Street, Long Island City 1, New York



## SANITATION IN SCHOOLS

To service the School Systems throughout the United States and Canada, West maintains branch sales offices in 60 major cities from Coast to Coast. Close to 500 West Representatives, specially trained in the sanitation needs and problems of Schools, are ready to serve you.

### SANITARY BUILDING MAINTENANCE

#### TERAMINE

Quaternary Odorless Disinfectant and Approved Sanitizer. F.D.A. Phenol Coefficients: 20 against EB. Typhosa, 28 against Staphylococcus Aureus (pus germs), and 7 against Escherichia Coli. Teramine's high bactericidal efficiency makes it unsurpassed for economy and efficiency. The mere change in dilution makes Teramine a Sanitizer or Disinfectant.



#### CORO-NOLEUM

Coal-Tar Disinfectant-Cleanser-Deodorant. Ideal for mopping, scrubbing and general cleaning, thus eliminating the need for soap. Coro-Noleum kills the germs of many communicable diseases.



#### WESTONE

To free atmosphere from dust caused by traffic, use Westone, a liquid chemical treatment that improves floor appearance as it controls dust. Westone has an affinity for dust, penetrating rapidly and evenly, offering maximum dust control with a minimum cost.



#### KWYKWAX

A water soluble wax for all types of floors, Kwykwax dries in less than 20 minutes producing a high, glossy finish. Kwykwax is a long-lasting floor preservative and finish that requires no rubbing or polishing.



#### LASTINCOTE

Available in clear or 11 attractive colors, Lastincote is a remarkable hard wear-resisting floor finish. Ideal for actively used floors such as gymnasiums. By penetrating the surface, Lastincote seals floors against dirt, oil, grease and moisture. Retards the harmful action of body perspiration, rubber burns, water, etc. Economical and easy to use.



#### ZOLEO

Zaleo is an ideal liquid cleaning soap for all types of floors except rubber. In solution, Zaleo softens the dirt and loosens the grease without hard scrubbing.



#### VAPOSECTOR FLUID

One of West's vast array of general and special purpose insecticides. Vaposector Fluid is a highly concentrated, permeating insecticide available in Regular, Odorless and Non-Inflammable forms. Non-toxic as well as non-staining, West Vaposector is unsurpassed in killing efficiency.

#### INSECTICIDE EQUIPMENT

A complete line of insecticide dispensing equipment ranging from small 25 ounce 1/10 h.p. hand operated units to larger 15 gallon 5 h.p. truck-mounted portable units are available to meet all school requirements. A manual on "Insect Control" covering this vast subject in detail is available by writing.



#### KOTEX VENDING CABINETS

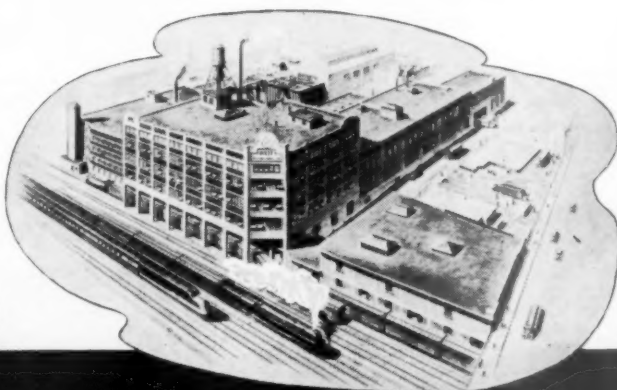
Exclusively distributed by West. Coin operated and other models available. Sanitary napkins individually wrapped.

Disposal units complete a modern sanitation program.

#### A SPECIALIZED WASHROOM SERVICE

To supplement the regular duties of your janitors, trained West Servicemen thoroughly service your washrooms on a regular, periodic schedule. This valuable service includes the cleaning of traps, urinals and bowls; disinfecting and deodorizing.

The purchase of Westamine, West Bowl Cleaner and Deodorants entitles you to this service at no additional cost!



WRITE FOR FREE BOOKLETS AND LITERATURE

# WEST *Disinfecting Company*

42-16 WEST STREET LONG ISLAND CITY 1, N. Y.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

# GENERAL ELECTRIC COMPANY

COMMERCIAL - INDUSTRIAL CLEANERS

Bridgeport 2, Connecticut

## Only 23½ pounds!

### A HEAVY DUTY COMMERCIAL CLEANER FOR WET OR DRY PICK-UP

#### Use this cleaner for:

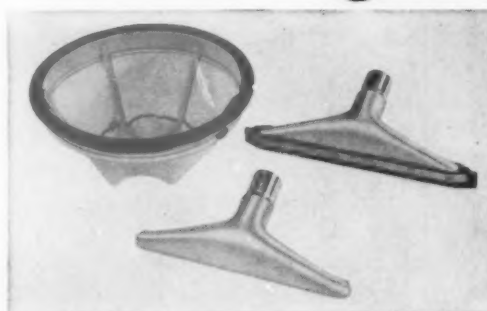
- Thorough cleaning of all rugs, carpets and runners
- Taking up mop water, shampoo suds, etc.
- Dusting draperies, ornaments and hard-to-reach areas
- Removing coarse dirt and litter, tracked-in gravel and papers



**Specifications:** Motor—110 volt, universal-type, a-c/d-c • Bearings—ball-type, greased for life • Long Cord—20-ft. heavy-duty, all rubber • Casters—hard rubber, silent • Capacity—large 5 qt., easy to empty container • Weight—23½ lbs. • Dimension—15½" high, 13¼" diameter • Finish—durable, two-tone gray.

Other models available for any commercial or industrial cleaning requirements

Lightweight, powerful, compact, only partially describes the new General Electric commercial vacuum cleaner. For wet or dry pick-up, this vacuum cleaner is truly "heavy-duty" yet light enough for easy operation. Weighs only 23½ lbs. 15½" high x 13¼" in diameter. Rubber cord with plastic plug. Chrome fittings.



Comes complete with tools for dry pick-up. For wet pick-up, accessories shown immediately below cleaner (wet pick-up bag, rubber squeegee for bare floors, metal squeegee for rugs) are offered at small extra cost.

For additional information, write to  
General Electric Company, Dept. 22-4602, Bridgeport 2, Conn.

## GENERAL ELECTRIC



# THE SPENCER TURBINE COMPANY

Hartford 6, Connecticut



## THE SPENCER CENTRAL VACUUM CLEANING SYSTEM

The Spencer Central Vacuum Cleaning System has met with the approval of architects and engineers everywhere, and has been installed in more than 10,000 buildings, including more than 1500 school buildings.

Spencer Central Vacuum Cleaning is a permanently installed system for the speedy and complete removal of dirt and dust from all kinds of floors, walls, ceilings, furniture and other building equipment. It consists of five essential parts, each carefully selected to meet the special requirements for each individual building:

1. A vacuum producer, located in the basement.
2. Inlet valves, conveniently located on all floors and piped to vacuum producer.
3. Specially designed, entirely enclosed, and easily cleaned separator.
4. Light weight, flexible hose.
5. Special vacuum tools for each operation.

**Advantages**—In exhaustive tests in leading schools, the powerful vacuum, scientifically applied with correct tools, has demonstrated its ability to remove more of the dirt in less time than other methods.

Because the equipment is simple in design, requiring little attention and because these systems are built to provide satisfactory service over long terms of years, both the operating and amortization costs are extremely low.

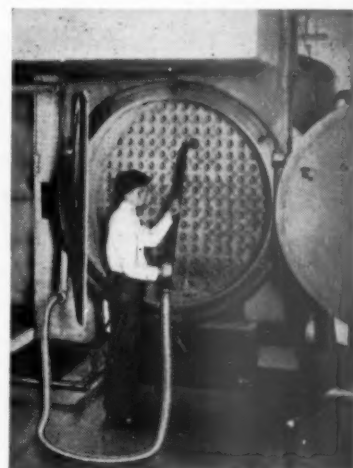
One janitor can clean twelve average sized class rooms in two hours with a 3 HP Spencer System. The Spencer elbow joint makes cleaning around furniture easy.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

**For Cleaning Erasers and Chalk Trays**—Spencer Vacuum Cleaning, instead of scattering the great bulk of the chalk dust on the floor, provides a method of cleaning erasers and chalk trays that is rapid, sanitary, easy and thorough. The janitor has only to attach a special tool and move it across the surface of eraser or chalk tray.

**Swimming Pool Cleaning Equipment**—By means of special cleaning tools usually employed in connection with the pump on the filtering system, it is possible to remove accumulated sediment from swimming pools without the waste of water involved in draining the pool. Bulletin on request.

**In Boiler Rooms**—Spencer Vacuum keeps boilers working at top efficiency by cleaning soot out of boiler tubes, in this way often saving the cost of the entire installation within a few years. Spencer Vacuum also keeps boiler room floors clean, and easily removes soot and dust from overhead pipes.



## SPENCER PORTABLE VACUUM CLEANERS

Spencer Portables built on the same principles of design and using the same vacuum tools are available in sizes from ½ HP up. The 1 HP unit illustrated is used extensively in schools. It has a large capacity dirt can which may be dropped to the floor by pressing the foot cam, and then rolled on its own casters to any point. Large bag area is cleaned by shaking without removing. Machine on large wheels, turns easily in small space. Ask for Bulletin No. 114-D.



# NATIONAL VULCANIZED FIBRE CO.

Wilmington, Delaware

## VUL-COT

TRADE MARK

### WASTE BASKETS

*famous for good looks... durability*

For years Vul-Cots have been the first choice waste basket by schools and colleges. The reasons are plain: They combine beauty, long life and economy; they are made of hard vulcanized fibre, a chemically converted cotton cellulose product. Vul-Cots are light weight, noiseless, do not crack, splinter, rust, dent or corrode. They are easily cleaned, reduce waste handling and maintenance costs. Available in an appealing range of sizes.

**THE ROUND TAPER**—Most popular of all Vul-Cots. Its cubical contents are more than adequate, takes up small space, is neat and attractive. Available in two practical sizes and in the standard colors, rich maroon-brown and olive-green.

	No. 2	No. 3
Top Diameter	12"	14"
Bottom Diameter	10"	12"
Depth	14"	16"

**THE SQUARE TAPER**—A distinctive style, popular for school and college offices, dormitories as well as classrooms. Choice of standard colors, maroon-brown and olive-green.

No. 5 Top 12" x 12" Bottom 10" x 10" Depth 15"

**THE ROUND STRAIGHT**—It is especially designed for use in cafeterias, basements, mail rooms and janitor service, etc. Available in two sizes and in standard colors—maroon-brown and olive-green.

	No. 9	No. 10
Diameter	14"	14"
Depth	20"	30"

#### 5 YEAR GUARANTEE

**IMPORTANT**—New Bonded Seam Construction in all Vul-Cot Waste Baskets adds strength—improves appearance.

**COLORS**—Nos. 2, 3, 5, 9 & 10 are made in the standard colors—maroon-brown and olive-green. Gray and other colors may be obtained on special order.

Write today for Catalog Price Sheet.

For sale by school supply houses and stationers.

Vul-Cots are made only by

**NATIONAL VULCANIZED FIBRE CO.**  
WILMINGTON DELAWARE



# J. A. SEXAUER MANUFACTURING CO., INC.

Dept. NA 2503-5 Third Avenue, New York 51, N. Y.

## Specialists in plumbing and heating maintenance materials for over 28 years.

Now — leading maintenance engineers everywhere standardize on 'SEXAUER' patented Precision Tools and Triple-Wear Replacement Parts — as advertised in the SATURDAY EVENING POST



### Leaky Fixtures Drain Operating Budgets

A 1/32" leak in a hot water faucet wastes 76,000 gallons yearly, worth \$10.13 at \$1 per M cubic feet and costing from \$27 to \$50 for the fuel to heat it. Multiplied by many faulty fixtures and connections, the loss soon reaches staggering totals.

**STOP THIS WASTE THE 'SEXAUER' WAY**



### 'SEXAUER' Methods Stop Leaks

Costly fixtures can be ruined by neglected leaks. Our patented Precision Tool re-forms rough raised, washer-chewing faucet and valve seats to a smooth, round, corrosion-resisting surface, better than when new. First step in a repair technique that has become standard operating procedure with maintenance men everywhere.



### "Easy-Tite" 300° F. Faucet Cushions

Follow-up to the seat reforming operation, pat'd. "Easy-Tites" outlast ordinary washers 6 to 1. Made of easy-closing DU PONT NEOPRENE, they resist absorption and withstand extreme high temperatures. Fabric-reinforced like a tire — won't split or mush out of shape.

Other 'SEXAUER' parts restore fixtures to long and useful service.



### Famous "Mule-Kick" Cleaners

"MULE-KICK" WASTE PIPE CLEANER prevents clogs, keeps drain free-flowing, sanitary. Safe to use—no choking or dangerous fumes.

"MULE-KICK" CLOSET BOWL CLEANER purges, deodorizes, restores glisten without rubbing or scrubbing.

"MULE-KICK" CREME PORCELAIN POLISH wipes away ugly stains, makes sinks, refrigerators, tile, metal, woodwork gleam like new. All "MULE-KICK" products have full, protected strength.

Favorites for 29 years — they cost less because they go further.



### FREE! VALUABLE NEW 1950 'SEXAUER' CATALOG

112 ILLUSTRATED PAGES

Lists over 2300 Triple-Wear Replacement Parts and patented Precision Tools. Write today for your free copy.

### A Nearby 'SEXAUER' Technician

will gladly consult with you on plumbing and heating upkeep problems. He'll survey your installation, if you desire, suggest economical balanced stocks—whatever the age or style your fixtures. No obligation. A postcard will bring him — and your free 'SEXAUER' catalog — promptly. Write today.

# SEXAUER

SPECIALISTS IN PLUMBING AND HEATING MAINTENANCE MATERIALS FOR 29 YEARS



# The MOTO-MOWER COMPANY

4600 Woodward Avenue, Detroit, Mich.

"moto-mower"—a  
quality product  
designed by  
specialists  
who...

have  
manufactur-  
ed power lawn  
mowers exclusively  
for thirty-two years



The Standard



The Super-Detroit



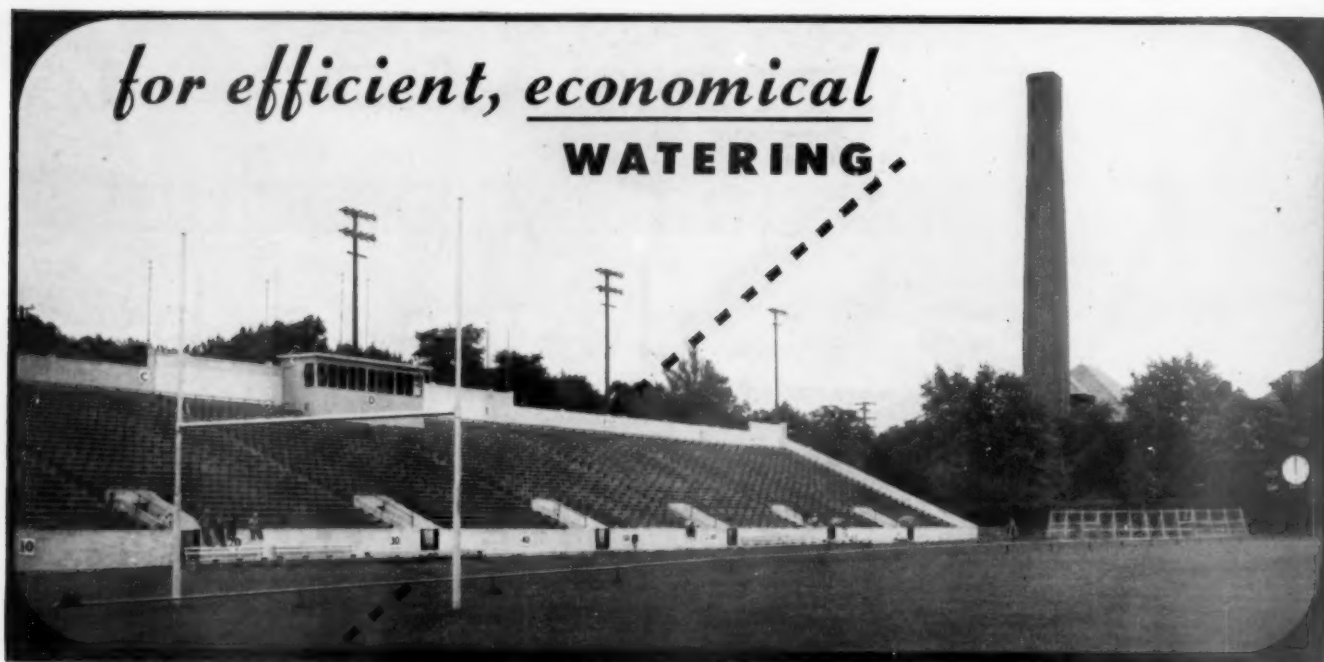
Commander-Triplex

... SIZES 17½" TO 71"



# MARCH AUTOMATIC IRRIGATION CO.

Muskegon, Mich.



## USE THE MARCH ATHLETIC FIELD SYSTEM

LaSalle-Peru Township  
High School and Junior College  
LaSalle, Illinois

Gentlemen:

We are very well pleased with the sprinkling system your company installed. It has given us excellent service.

Board of Education  
Montague, Michigan

Gentlemen:

We have used the March Irrigation System for the overhead watering of our Memorial Athletic Field for the past three summers. We have found it to be the most efficient and economical method for watering the field that we have seen or used. We have been able to keep the field green and growing with a minimum amount of attention and care. We can recommend this system of irrigation.

The above two excerpts are typical of the thorough and universal satisfaction of the users of the MARCH ATHLETIC FIELD SPRINKLING SYSTEM.

If you want a system that does a perfect job, that eliminates 95% of all manual labor, and yet costs but a fraction of the fully automatic set-up, by all means, investigate the MARCH ATHLETIC FIELD SPRINKLING SYSTEM. Write for descriptive literature, NOW!

# THE ECLIPSE LAWN MOWER COMPANY

Factory and General Offices: Prophetstown, Illinois

*Eclipse* THE WORLD'S BEST LAWN MOWER

## IT COSTS LESS WITH THE BEST



In the long run, trouble-free mowing perfection combined with operating economy of your Eclipse Lawn Mowers makes even the low first cost secondary.

Durable rugged construction engineered for simple handling ease assures extended service with little or no maintenance.

The complete line of Eclipse Lawn Mowers includes hand and power models to meet every grass cutting requirement. Nation-wide warehouse and service facilities assure delivery and maintenance. Write for detailed descriptive booklets.



**ECLIPSE ROCKET**... Popular favorite because of its operating economy, durability and performance. Finger tip control, heavy duty reel, oil tempered knife and natural grip all steel handles are among distinctive features.



**ECLIPSE MODEL L**... In 16" and 18" size, this 5 blade hand model offers exclusive finger tip adjustment, automatic sharpening, natural grip all steel handle and many other outstanding features.



**ECLIPSE SPEEDWAY**... Fastest by far, this model mows a 32" swath, 200 yards long per minute by actual stop watch timing. Unmatched for time and money saving large area mowing.



# GRAVELY MOTOR PLOW & CULTIVATOR CO.

Box 52, Dunbar, W. Va.

## Solve These Year-round Maintenance Problems With the Powerful 5-HP GRAVELY Tractor and Attachments



### MOWING LAWNS

Lawn areas are kept neat and beautiful with the GRAVELY Rotary Mower. This 30" Reel Mower will not scalp or streak, has the famous GRAVELY Swivel Action which allows it to follow the contour of the ground regardless of the position of the Tractor wheels. . . . Completely Gear-Driven direct from the engine. Self-sharpening feature, floating reel, and the Gravelly Slip Clutch, which prevents damage to the reel, make this an investment that will give years of trouble-free service. If your areas are large, attach two 25" gang units to the 50" unit and you have a gang mower that mows a 72" swath. The gang units are also gear-driven direct from engine. Riding Sulky speeds up work.

### MOWING WEEDS and BRUSH

Weed and brush up to 3/4" in diameter, and tall, fine grass—these fall swiftly before the powerful GRAVELY Sickle Mower attachment. Fully gear-driven, available in either 2" or 3" sections, in lengths from 42" to 60", the GRAVELY Sickle Mower will solve your heavy mowing problems quickly, easily, economically. Swivel action and slip clutch, of course. Equipped with Extension Axles, the GRAVELY can mow on slopes as steep as 60 degrees. The mower in front enables you to mow under shrubs, in fence rows, close to buildings; the Reverse permits backing out under your own power.

### REMOVING SNOW

Snow Removal is easy and inexpensive when you use GRAVELY Equipment. It moves wet snow up to 18" deep. The sturdy 1/4" steel blade is fitted with a replaceable wearing edge of malleable iron. Simple pin adjustment allows you to change the angle of the blade so that it throws the snow either left or right, or bulldozes straight ahead. 48" width, will clean the standard driveway in two sweeps or the average walk in one. The design of the blade is such that the snow is rolled up and out, which means the GRAVELY Snow Plow will move more snow faster than the ordinary snow plow blades. Chains are available for extra traction in icy weather.

### 19 ATTACHMENTS FOR EVERY GROUND MAINTENANCE JOB

There is an attachment for every maintenance job. They are listed below. Each attachment is designed specifically for the GRAVELY Tractor. The price of the Tractor and any attachment you need is moderate. Write for FREE Catalog and prices. Special folder on Snow Removal available—ask for "No Worries When Snow Flurries".

#### • ATTACHMENTS •

Rotary Mower	Ballast Roller
Gang Mowers	Air Compressor
Sickle Mower	Geared Wheels
Snow Plow	Extension Axles
Hauling Cart	Dual Wheels
Power Brush	Fertilizer Distributor
Power Take-Off	Seeder
Riding Sulky	Hay Rake
Estate Sprayer	Disc Harrow
Rotary Plow	Peg Harrow
Cultivator	

#### • TRACTOR SPECIFICATIONS •

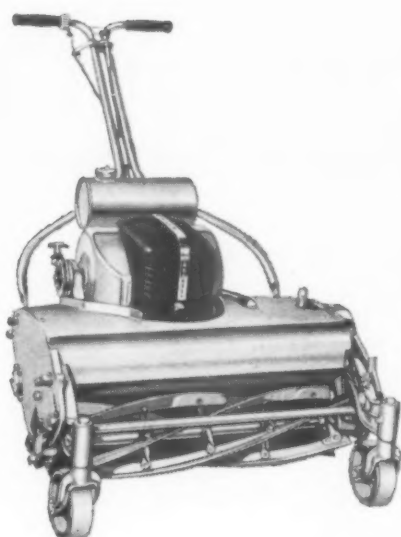
5-HP Motor, own make  
 3/4" Bore; 3 1/2" Stroke  
 Two Speeds Forward and REVERSE  
 Separate Attachment Clutch  
 Completely Gear Driven—no belts or chains  
 Scintilla Impulse Magneto  
 Zenith Carburetor  
 One-Spot Lubrication, with AC Oil Filter  
 Gas Capacity, 2 gallons, enough for 8 hours' work  
 Attachments quickly changed by four bolts in four minutes



Send for Your FREE Copy of  
**POWER vs. DRUDGERY — the Complete GRAVELY CATALOG**

# JACOBSEN MANUFACTURING COMPANY

Racine, Wisconsin

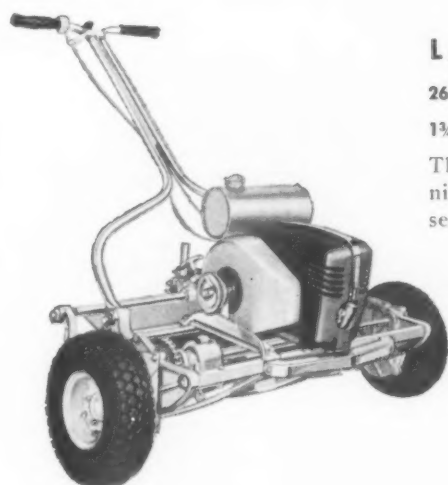


## ESTATE 24

24-Inch Cutting Width

1 1/4 hp. Jacobsen 2-Cycle Engine

For maintaining large lawn areas where only the finest cutting is acceptable. High frequency of cut produces a velvet-like turf. Rear roller drive permits exceptionally close trimming around trees, buildings, flower beds, etc.



## LAWN KING

26-Inch Cutting Width

1 1/4 hp. Jacobsen 2-Cycle Engine

This fast-starting, smooth-running unit has an abundance of reserve power for the tough cutting jobs. Yet despite its top-to-bottom ruggedness it maneuvers under an almost effortless touch. For increased capacity during long sustained cutting periods, attach a riding sulky to the powerful Lawn King.



## POWER SCYTHE

36-Inch Cutting Width

1 1/4 hp. Jacobsen 2-Cycle Engine

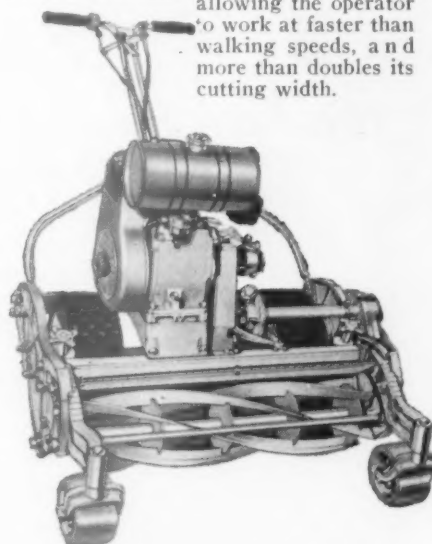
Here is the answer to quick, positive weed control with a minimum of operator fatigue. The use of opposed counterweights at the knife-head drive eliminates almost all arm-tiring vibration. Widely spaced knob-tread rollers insure positive traction and stability when cutting on hillsides or rough ground.

## PARK 30

30-Inch Cutting Width

3 hp. 4-Cycle Engine

This rugged, large area machine is designed to take bigger swaths per pass, more passes per hour. Rear roller drive allows it to maneuver easily in close quarters. The use of a riding sulky and side units greatly increases capacity by allowing the operator to work at faster than walking speeds, and more than doubles its cutting width.



## POWER LAWN EDGER

1 1/4 hp. Jacobsen 2-Cycle Engine

With the Jacobsen Power Lawn Edger you can edge and trim grass along walks, curbs and shrubbery speedily, reducing trimming costs substantially. Powered by the dependable Jacobsen 2-cycle engine, this Edger quickly trims along straight or curved edges... works equally well when cutting sod adjacent to concrete curbs or flower beds.



# MODERN MANUFACTURING COMPANY

Manufacturers of

MODERN Rotary Power Sweepers · MODERN Power Edger & Trimmer  
MODERN Lawn Mower Sharpener

160 North Fair Oaks Avenue, Pasadena 1, California



This is Model 48. It Sweeps a Full 48" Width

## The Modern Rotary Power Sweeper

Sweeps any place a rake or broom can be used

This all-around, all-purpose sweeper for lawn, terrace, yard, auditorium, sidewalk and street will sweep any place a rake or broom can be used. It is well adapted for use close up to a building or curb. It picks up and sweeps:

- LEAVES
- NAILS
- BOTTLE CAPS
- DEBRIS
- TWIGS
- ALL METAL OBJECTS

## Modern Lawn Mower Sharpener

Precision-grinds any lawn mower in 10 to 20 minutes

A mower sharpened by this MODERN Sharpener lasts longer and cuts easier, with less strain on gears and bearings. You can sharpen any type mower from a

5-inch edger to a 36-inch power mower — to extreme ends of both right and left twist reel blades.

No dismantling. No extra attachments required. Simple sliding bar clamps hold mower or bed knife securely in sharpening position.

1. Speed: 10 to 20 minutes per mower to be sharpened.
2. It grinds both reel and bed knife parallel from end to end. No hand filing is required.
3. Precision: The result is a scissorlike action of remarkable precision (unheard of heretofore in lawn-mower sharpening).
4. Handle, wheels, roller and motor remain in place while sharpening is in progress.
5. No extra attachments required.
6. One lever puts mower or bed knife into grinding position.
7. 100% steel construction.
8. Small, compact, easy to operate.



## Modern Power Edger and Trimmer

Nothing adds more to the grooming of a long sweep of school lawn than neat, well-cut borders. For a job well done, use the new MODERN Lawn Edger and Trimmer.

**MODERN POWER  
EDGER AND  
TRIMMER**

— the machine for  
beautifying school  
lawns



Powered by a 4-cycle motor, using a minimum of fuel, this edger and trimmer is easy to handle and a pleasure to use. Light, compact. Saves time and labor. Made of 100% steel.

Write for full information and name of your nearest dealer

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



# WILSHIRE POWER SWEEPER COMPANY

*"Sweeping the Country Since 1940"*

4615 Alger Street, Los Angeles 39, Calif.

## WILSHIRE POWER SWEEPER

Vacuums leaves, papers, dirt, sand and refuse, both indoors and outdoors.

Efficient modern schools and other institutions all over the country use WILSHIRE, the power sweeper specially designed to do a thorough cleaning job both indoors and outdoors. It picks up everything from dust to cigarette butts—even pop bottles—in one easy sweeping operation. Cleaning costs and time reduced as much as 75%, thus saving its cost over and over again. It sweeps right up to walls or equipment without marring—vacuums as it sweeps.

Wilshire Power Sweepers are thoroughly factory tested, with a 90-day guarantee.

## Ask Those Who USE THEM!

For your own protection, investigate before you buy. We unhesitatingly refer you to present users, among them these outstanding schools:

CALIFORNIA Institute of Technology    University of PENNSYLVANIA  
University of ILLINOIS    BROWN University  
VIRGINIA Medical College

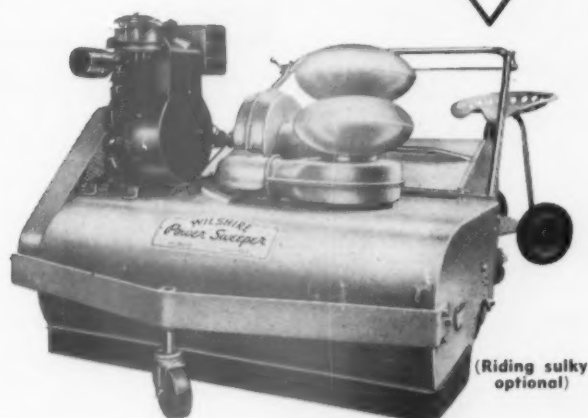
Write for illustrated literature. There is a Wilshire Power Sweeper to meet every school's requirements.



## Wilshire's Finest... MODEL 1000

- 100% visibility
- High maneuverability
- Fast, efficient operation
- Special Wilshire dust control
- Either 36" or 48" sweep

## MODEL 800



(Riding sulky optional)

### FREE DEMONSTRATION on YOUR JOB

The best way to select the sweeper that fills your needs. Write for full information and name of dealer nearest you. (Dealers throughout the U. S. and Canada.)

# WORTHINGTON MOWER COMPANY

Stroudsburg, Pennsylvania

## WORTHINGTON ROTARY DISC MOWERS For Grass Cutting and Weed Control

Worthington Rotary Disc Mowers are especially suited for general school ground and campus maintenance. Their rotary disc cutters knife right through heavy growths, weeds and even small brush—keep grass short and trim. 8 models—cutting widths from 18 to 62 inches.

### MODEL 18

This low-cost mower combines the proved cutting ability of larger rotary disc mowers with light weight for unmatched ease of handling. Two-piece handle for easy transportation. Weighs only 54 lbs. complete. Powerful Jacobsen 2-cycle engine. 18-inch cutting width.



### MODEL 20-R

The rugged, self-propelled 20-R wades right into tough weeds and heavy growths—has plenty of power for hillside cutting. A top-notch mower for general purpose maintenance of school lawns. 2 hp., 4-cycle engine, 20-inch cutting width.



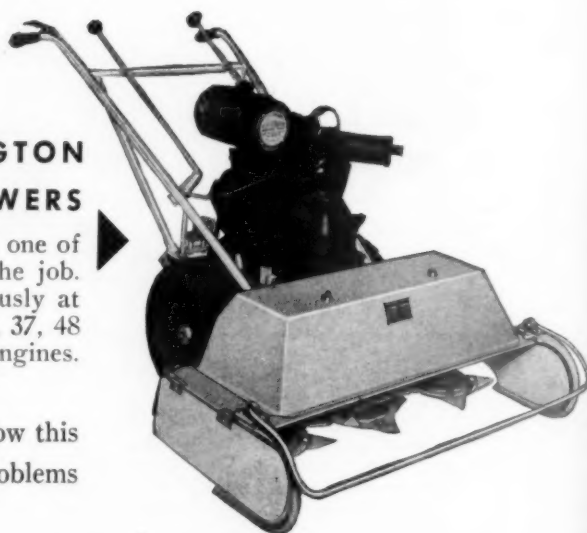
### MODEL 20-A TRIMMING MOWER

Identical to 20-R except for aluminum disc front wheels for trimming work. Cuts to within a fraction of an inch of trees, fences, etc. Disc wheels are interchangeable with rubber-tired front wheels of 20-R and vice versa. Special changeover kit available for this purpose.

### WORTHINGTON

### BIG CAPACITY ROTARY DISC MOWERS

You can measure grass cutting by the acre when one of these big, fast-working rotary mowers tackles the job. Riding sulky enables operator to work continuously at faster than walking speeds. Available in 25, 31, 37, 48 and 62-inch cutting widths. 4.6 to 7.5 hp., 4-cycle engines.



**Ask** your Worthington dealer for a demonstration. See how this all-purpose rotary disc mower solves your maintenance problems quickly, easily.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

*In the West* **STANCAL ASPHALT & BITUMULS COMPANY**

200 BUSH STREET • SAN FRANCISCO 4, CALIF.

Los Angeles 14, Calif. • Oakland 1, Calif. • Portland 7, Ore. • Tucson, Ariz.

*In the East* **AMERICAN BITUMULS COMPANY**

200 BUSH STREET • SAN FRANCISCO 4, CALIF.

Washington 6, D. C. • Baltimore 3, Md. • Perth Amboy, N. J.

Columbus 15, O. • St. Louis 17, Mo. • Baton Rouge 2, La.

E. Providence 14, R. I. • Mobile, Ala. • San Juan 23, P. R.



Photo — Courtesy U. S. Naval Academy

**Laykold**

and

**GRASSTEX**



Laykold Courts — Potomac Park, Washington, D. C.



Courts at a Leading Western University

## TENNIS COURTS

Modern schools are turning to all-weather, trouble-free Black, Red or Green **Laykold** and **Grasstex** Courts — because:

1. Increased enrollment demands more playing time per court (or more courts).
2. Clay court maintenance cost is prohibitive and playing time is lost after rains.
3. Tennis Teams trained on all-weather courts are months ahead of competition.
4. Laykold and Grasstex Courts have a background of 20 years' experience.

### TENNIS COURTS — Resurfacing

By low-cost unique methods your old all-weather courts can be renewed with Laykold Resurfacer and Wear Coat.

### WALKS, DRIVES, AND PARKING AREAS

**Bitumuls**, a cold, liquid emulsified asphalt. Ideal for road construction and repairs with your own forces. Available in drums or in bulk.

**Bitumuls Walk Top** (Black, Red or Green). A non-skid, smooth seal for broom or squeegee application on paved areas.

### FLOORS

**Laykold Floor Mastic Binder**—An Asphalt Emulsion for mixing with cement and aggregates for underlayment, or wearing course mastics.

**Laykold Tile Set**—A proven adhesive for holding asphalt tile.

**Laykold Step Grip**—A non-skid, carborundum-filled mortar, ready for application over stairs, walks, and ramps.

### ROOFING

**Laykold Fibrecoat**—A low-cost mineral armored asphalt of unsurpassed weathering properties for roof retreatment.

For information on Tennis Courts or other LAYKOLD PRODUCTS, consult our District Offices.

Booklets — Estimates  
— Counsel



THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



# ANCHOR POST FENCE DIVISION

ANCHOR POST PRODUCTS, INC.

Complete Line of Fences and Gates  
6695 Eastern Ave., Baltimore 24, Md.

SALES OFFICES IN PRINCIPAL CITIES

## ANCHOR FENCES FOR SCHOOLS AND SCHOOL PLAYGROUNDS

The Anchor Post Fence Division of Anchor Post Products, Inc. has been serving public schools and colleges, municipalities and industrial plants with fencing to suit their various requirements for half a century.

### Anchor Chain Link Fences

Makers of America's first chain link fence, the Anchor Post Fence Division today manufactures a complete line, and will be glad to supply any interested school executive or architect with a copy of our Chain Link Fence Catalog containing full information about the four exclusive features which make an Anchor Chain Link Fence exceptionally attractive and durable. Ask for Catalog No. 110.

### Anchor-Weld Iron Fences and Gates

Through the exclusive Anchor-Weld method of construction, the Anchor Post Fence Division is able to manufacture iron fences and gates which equal in appearance many expensive hand-wrought products. Many schools throughout the country are today justly proud of their beautiful Anchor-Weld Ornamental Iron Fences and Gates. Some of these are to be found illustrated in our Catalog No. 111.

### Anchor's Four Features

1. **ANCHOR-WELD WIRE GATE**—built with a frame of square tubular steel—arc-welded at the corners. The square shape of the heavy steel tubing, together with the welding of the corners, provides a framework of such exceptional strength that no re-enforcing diagonal braces are needed. We claim that this is the strongest and most attractive wire gate made.

2. **SQUARE TERMINAL POSTS**—stronger because they are square in section. More protective—having no fabric-holding bands and therefore providing no footholds for climbing. Better-looking—because of their graceful lines.

3. **LINE POSTS**—choice of H-Beam or Pipe.

4. **DRIVE-ANCHORAGE**—grips the soil like the roots of a tree. We have imitated nature's engineering by providing the line posts with a broad foundation. Anchor drive-anchors defy thaws, frosts and the many other strains to which a fence is subjected.

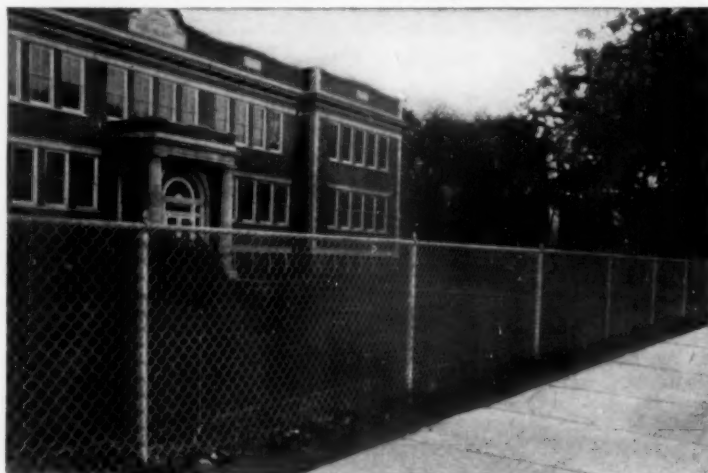
Note: While we strongly advocate the drive-anchor method of setting posts, we can, if desired, set our posts in concrete footings when conditions warrant such a procedure.



Anchor  
Drive-  
Anchorage



Anchor-Weld  
Wire Gate



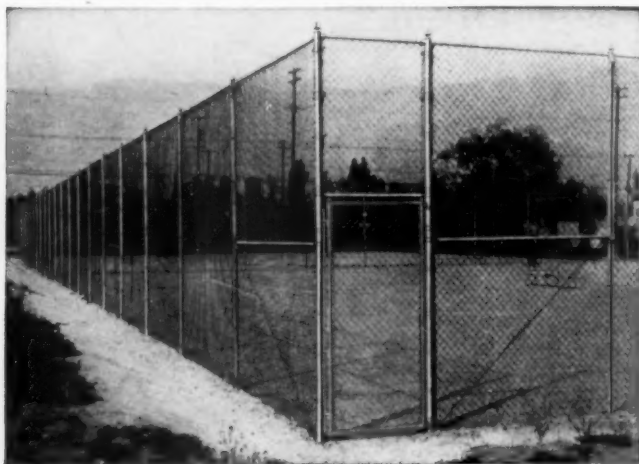
Anchor Chain Link Fence with Top Rail  
High School, Mineola, N. Y.



Anchor  
H-Beam  
Line Post



Anchor Square  
Terminal  
Post



Anchor Chain Link Tennis Court Enclosure at Pasadena  
High School, Pasadena, Calif.



Anchor-Weld Fence Surrounding St. Anne's School,  
Fall River, Mass.

# THE COLORADO FUEL AND IRON CORP.

Continental Oil Building, Denver 2, Colorado

## AND SUBSIDIARIES

WICKWIRE SPENCER  
STEEL DIVISION

361 Delaware Ave., Buffalo 2, N. Y.

THE CALIFORNIA WIRE  
CLOTH CORPORATION

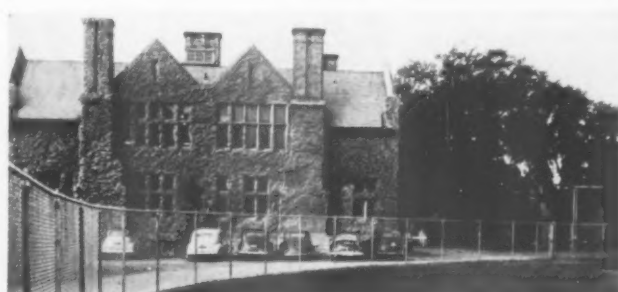
1080 19th Ave., Oakland 6, Calif.

BRANCHES AND ERECTORS IN KEY CITIES EVERYWHERE



# REALOCK FENCE

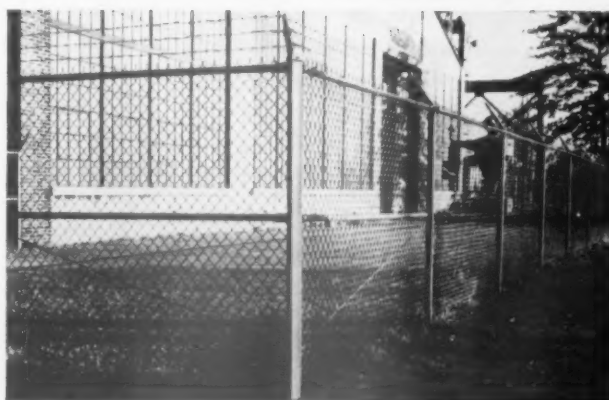
Used in the protection of playgrounds, power plants, athletic fields, tennis courts and similar types of property, a Realock Chain Link Fence will provide years of trouble-free service. Made of steel wire, heavily galvanized, it is tamper-proof, weather-resistant, low in cost. It is available in standard heights up to and including 12 feet; barbed or knuckled selvage; with or without barbed wire topping. All posts are furnished to set in corrosion-resisting concrete footings.



**REALOCK TYPE 420 FENCE**, seven feet high, with  $2\frac{1}{2}$ " O.D. pipe line posts,  $1\frac{1}{2}$ " O.D. top rail, and 3" O.D. end and corner posts. The tubular post is of full weight, heavily galvanized structural pipe designed to absorb rough, rugged use without repair or replacement for many years.



**REALOCK TENNIS COURT DESIGN.** Illustration shows a typical Tennis Court Fence design. Two types are available—310 (Light construction) and 420 (Heavy construction). Standard heights, 8', 10' and 12'.



**REALOCK TYPE 423H FENCE** using "H" section line, end and corner posts. Topped with three strands of barbed wire. Five and six strand barbed wire topping also available for use where maximum protection is desired.



**REALOCK TYPE 420H FENCE.** Same as Type 420 except that line posts are of "H" beam type (2.25 x 1.95 inches). This illustration shows barbed selvage at bottom of fence fabric and knuckled selvage at top.

## FREE CATALOG — FREE ESTIMATES

Without obligation, we will be happy to have the Realock representative in your territory measure your property, work out details for proper protection and submit estimates for fence material ready for erection or covering complete installation by trained crews. For free catalog and further particulars, write to our nearest office.

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

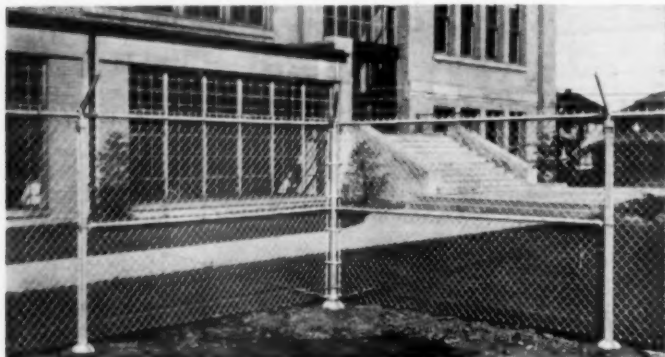
# CONTINENTAL STEEL CORPORATION

Manufacturers of Chain Link Fence for All Purposes

General Offices: Kokomo, Indiana

## SALES REPRESENTATIVES IN THE FOLLOWING CITIES

Alexandria, Austin, Atlanta, Canton, Chicago, Columbus, Dallas, Dayton, Des Moines, Detroit, El Paso, Evansville, Ft. Wayne, Grand Rapids, Indianapolis, Kansas City, Louisville, Minneapolis, New Orleans, New York, Norfolk, Oklahoma City, Omaha, Philadelphia, Richmond, San Antonio, South Bend, St. Louis, St. Paul, Toledo, Tulsa, Wichita



### COMPLETE CHAIN LINK FENCE

To meet the fencing requirements of schools and universities, Continental has developed a wide range of structural variations in its Chain Link Fence. The selection in styles, heights, types of top construction, gates and accessories makes it possible for schoolmen to select the best fence for any installation.



### FABRIC OF KONIK STEEL

The wire fabric in Continental Chain Link Fence is made of KONIK—a new steel containing copper, nickel and chromium for greater strength and rust resistance "clear through." This superior fence fabric carries a zinc coating applied by a special hot dip process to insure uniformity and adhesion of the coating to the base steel. A uniform, bright finish enhances the appearance of Continental fence fabric. Wire is full gauge and woven in exact mesh.

### TAILORED TO FIT SCHOOL PROPERTY

Experienced fence engineers plan and help erect Continental Chain Link fence anywhere. No matter what your property protection problem, Continental engineers will work with you in laying out the most effective and economical installation—planned to harmonize with the character of school property, and provide the type of protection you want.

### 12 STYLES

Continental offers 12 styles of top construction for Chain Link Fence. Six popular styles are illustrated to the right. Continental fence is engineered for each specific job.

### POSTS AND FITTINGS

Continental fence has heavier, sturdier posts with improved brace construction. Top rails are joined by a special Inside-Outside coupling. Post caps and barbed wire arms are sturdy, heavier. Self-locking slots hold barbed wire. New type lock pin eliminates bolts and nuts for fastening fabric to tension bands.

### GATES

Strong and easily operated gates and locking devices. Single and double types with improved pivot type hinges. Manually or mechanically operated.

### ENGINEERING AND ERECTION SERVICE

Our engineers are prepared to assist you in laying out the most economical installation for your purposes. Trained erection crews are available for correct and economical construction anywhere. When local labor is used Continental will supply competent foreman and inspection service.

### SEND FOR FREE MANUAL

This file size book contains more than 100 illustrations, will help you evaluate fence protection, select right style of fence. Write the

CONTINENTAL STEEL CORPORATION  
KOKOMO, INDIANA

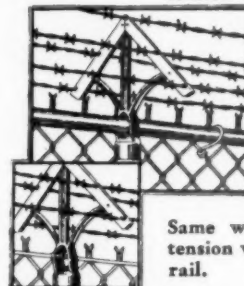


### A STYLE TO MEET EVERY SCHOOL NEED



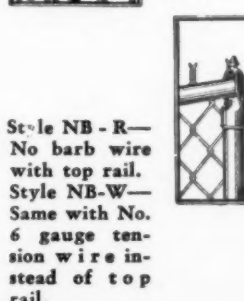
Style 3B-R—Three strands of barb wire with top rail. Arm of 12 gauge pressed steel. Barb wire held in angle slots and automatically locked in place by tension.

Style 3B-W—Same with No. 6 gauge coil spring tension wire instead of top rail.

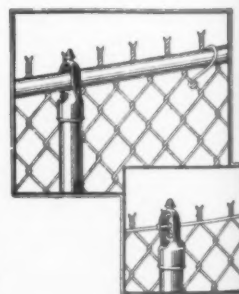


Style 5B-R—Five strands of barb wire with top rail. Top rail of tubular steel 1 1/2" O.D. Has 7" expansion sleeves.

Style 5B-W—Same with No. 6 gauge tension wire instead of top rail.



Style NB-R—No barb wire with top rail. Style NB-W—Same with No. 6 gauge tension wire instead of top rail.



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THE AMERICAN SCHOOL AND UNIVERSITY—1950-51



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(American Steel & Wire Company)

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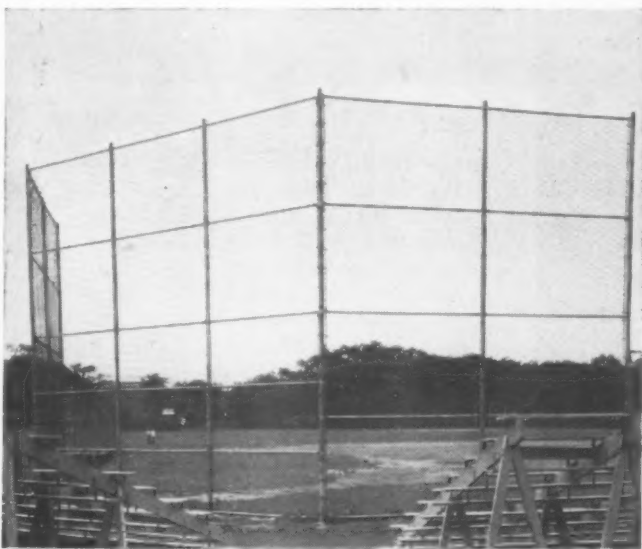
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**Cyclone is the trade-mark name of fence made only by Cyclone Fence Division. Accept no substitute.**

**NO JOB IS TOO LARGE**

**—NO JOB IS TOO SMALL FOR CYCLONE**



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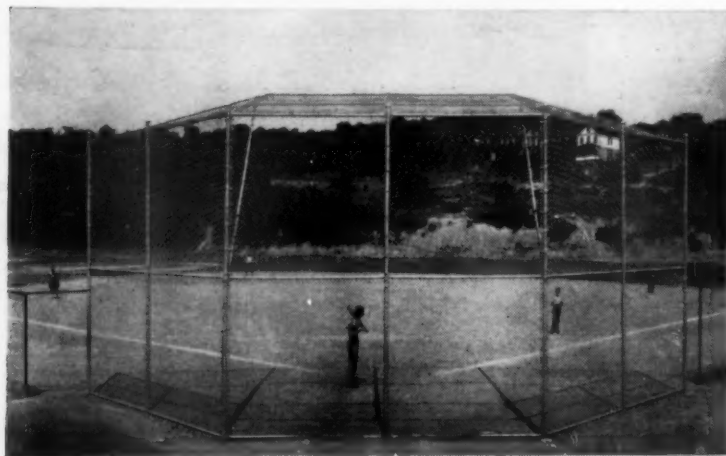
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Grant Building, Pittsburgh 30, Pa.

## Pittsburgh Chain Link Fence

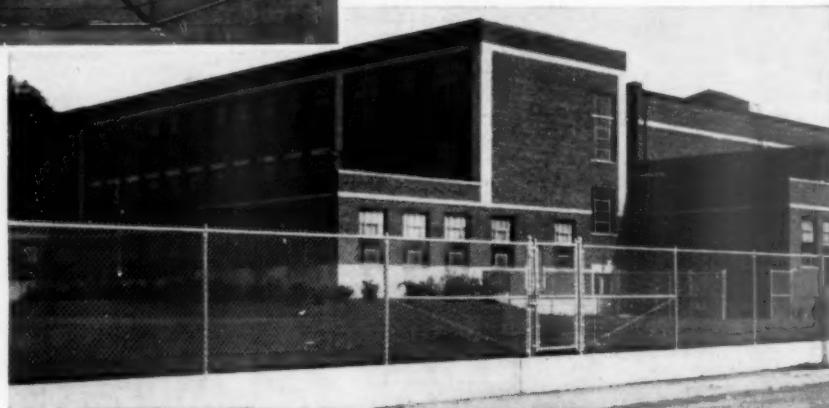
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Pittsburgh Guardian Chain Link Fence illustrated at right is popular for protecting school yards and playgrounds. Selvage of chain link fabric can be dressed above top rail or knuckled flush as desired. Write for information on other types of Chain Link Fence.



### PROPERTY PROTECTION BY PITTSBURGH

THE AMERICAN SCHOOL AND UNIVERSITY—1950-51

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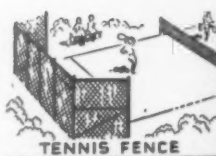
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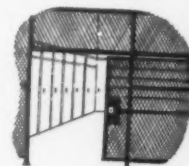
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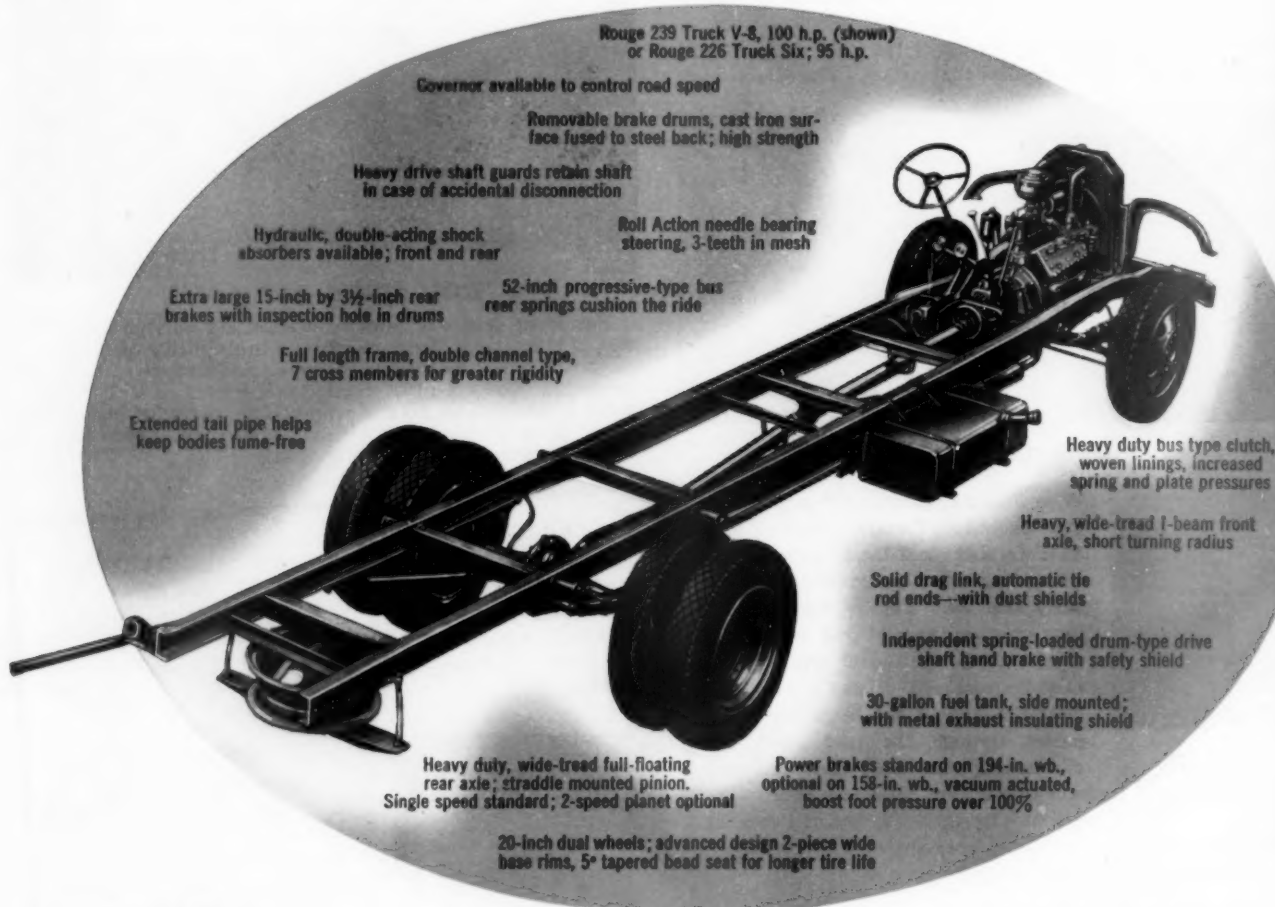
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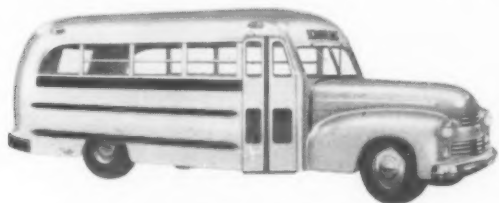
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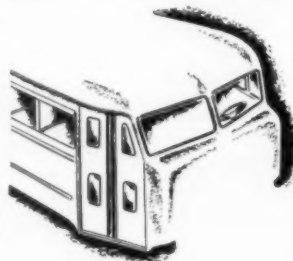
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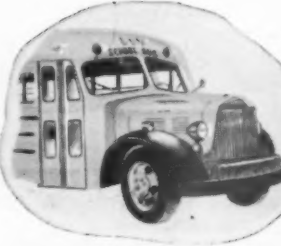
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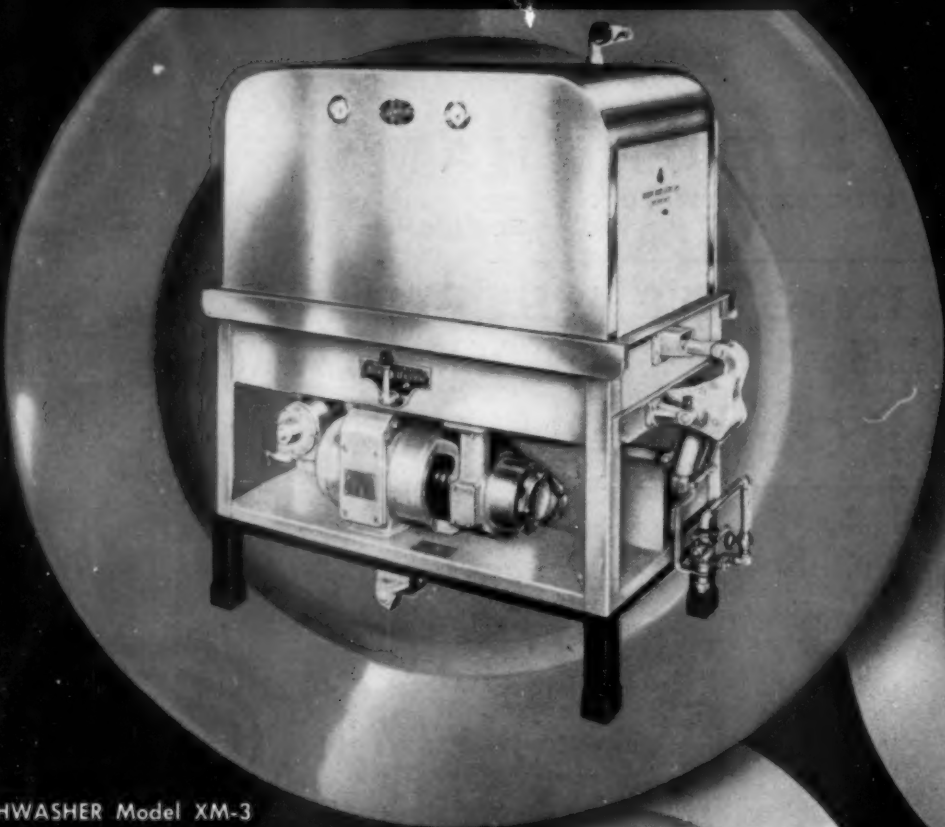
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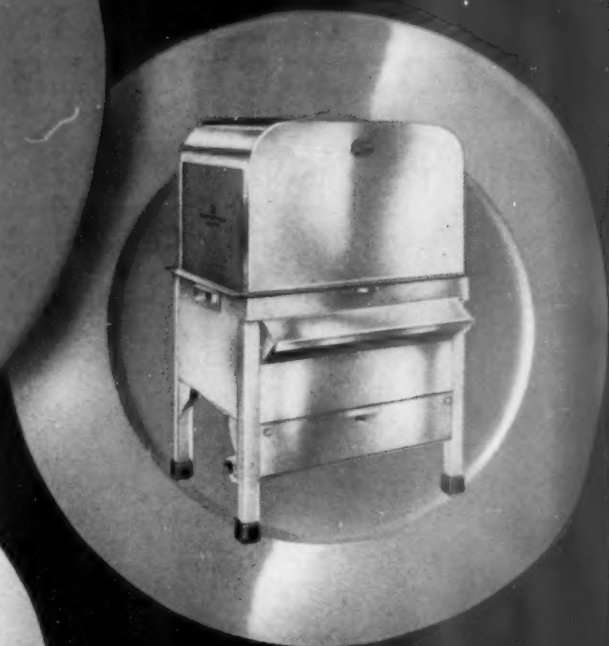
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## EDITORIAL INDEX BY SUBJECT CLASSIFICATION

The subject index includes all articles in the present Volume XXII, and those for the five preceding years, Volumes XVII-XXI. Also included are selected articles of particular significance from Volume X (1938) through Volume XVI (1944). The classification of articles under appropriate headings should increase the usefulness of and ease of locating materials in the index. Index of authors follows on page 893.

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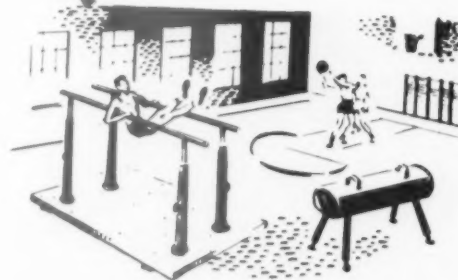


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For a small down payment, you can have a Manley popcorn machine installed in your school. It starts making money for you immediately. "Machine paid for... \$1100 profit in 5 months," says the Community High School, Granite City, Ill. Write us on the handy coupon.



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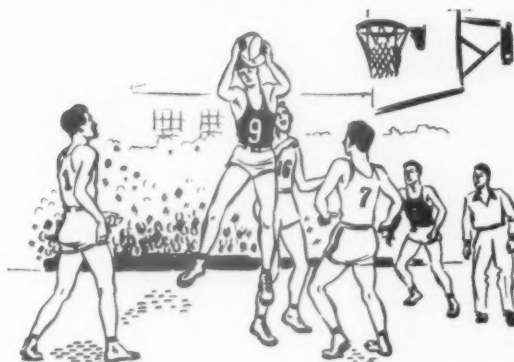




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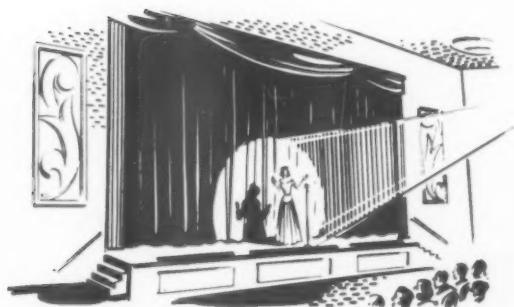
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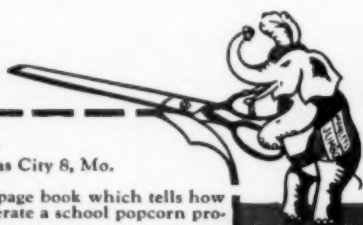
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				Whipple, Gertrude, <i>Methods of Teaching Geographic Understanding</i> . . . . .	XIX	1947	194
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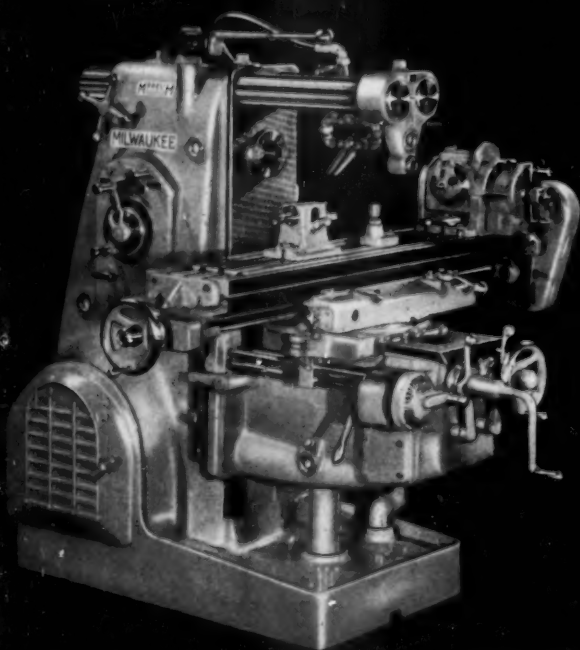
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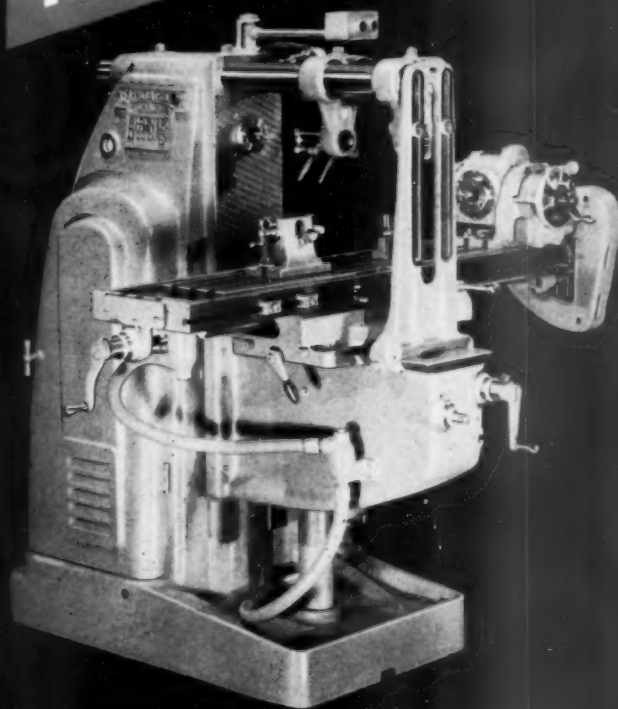
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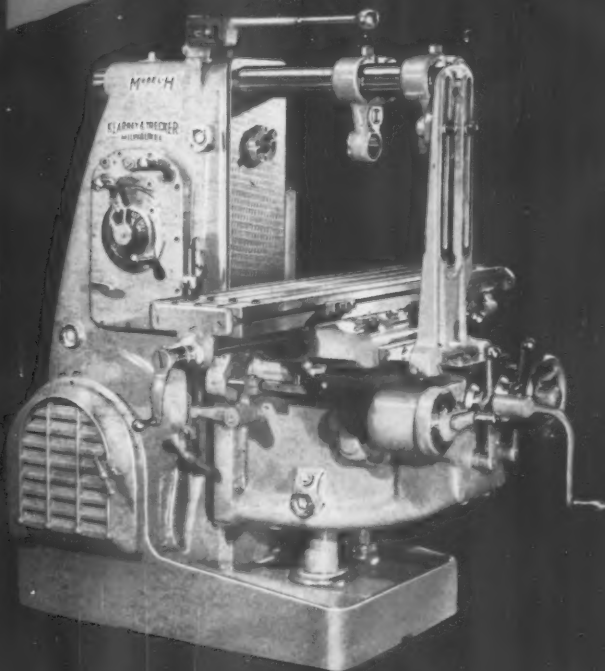
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Pueblo

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Chicago  
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Joliet  
Moline Board of Education  
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Rockford Senior High School  
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Sterling  
University of Illinois - Urbana

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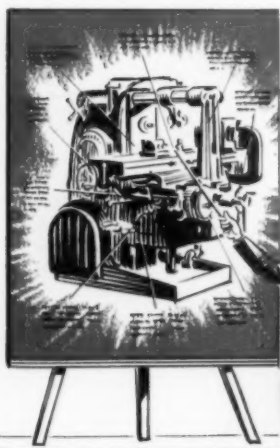
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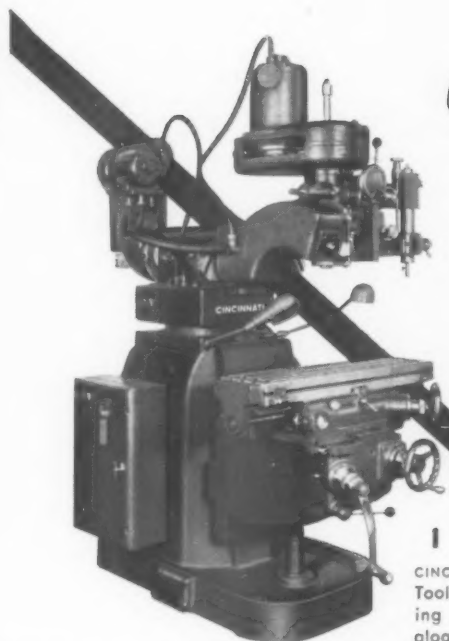
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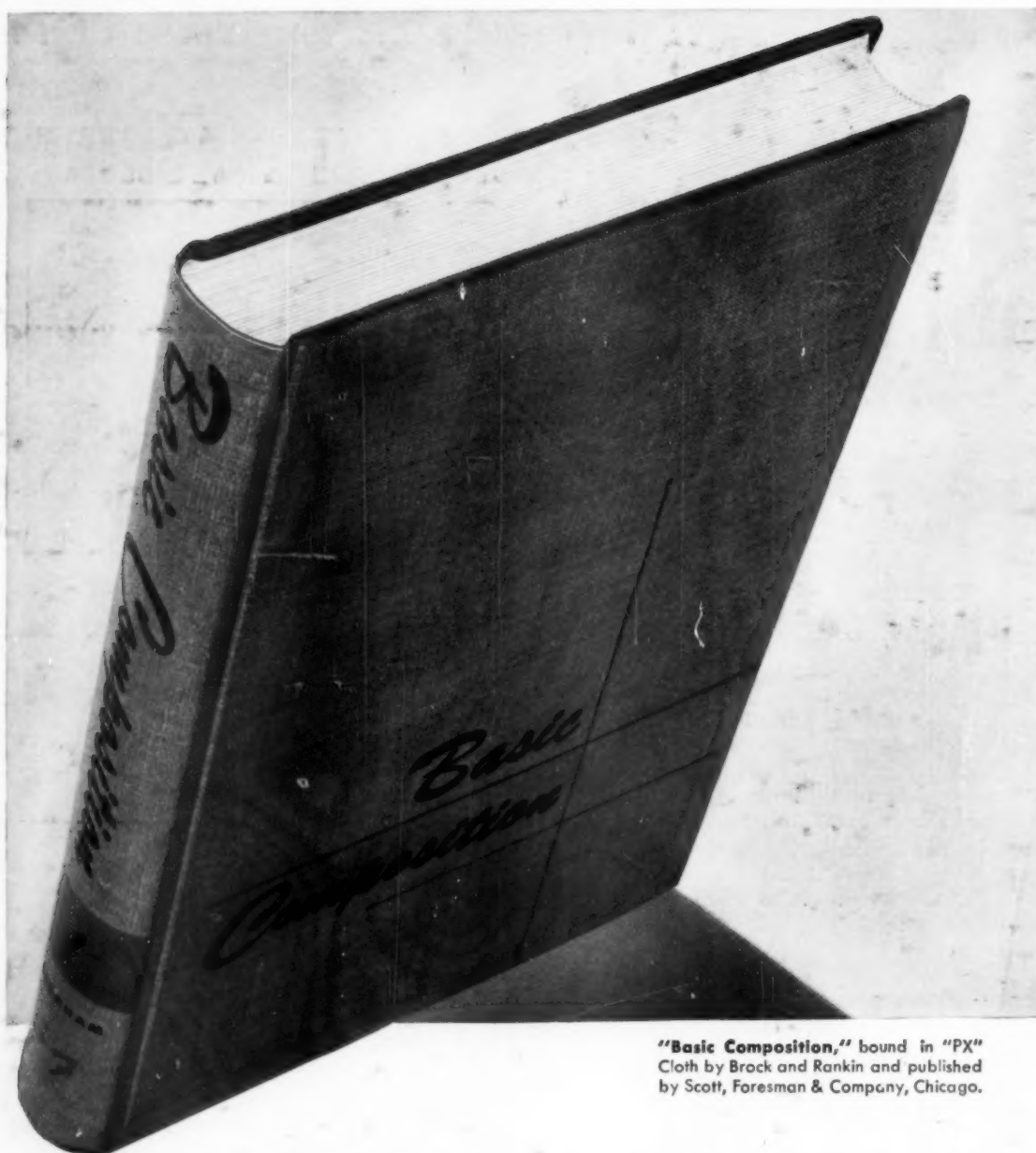
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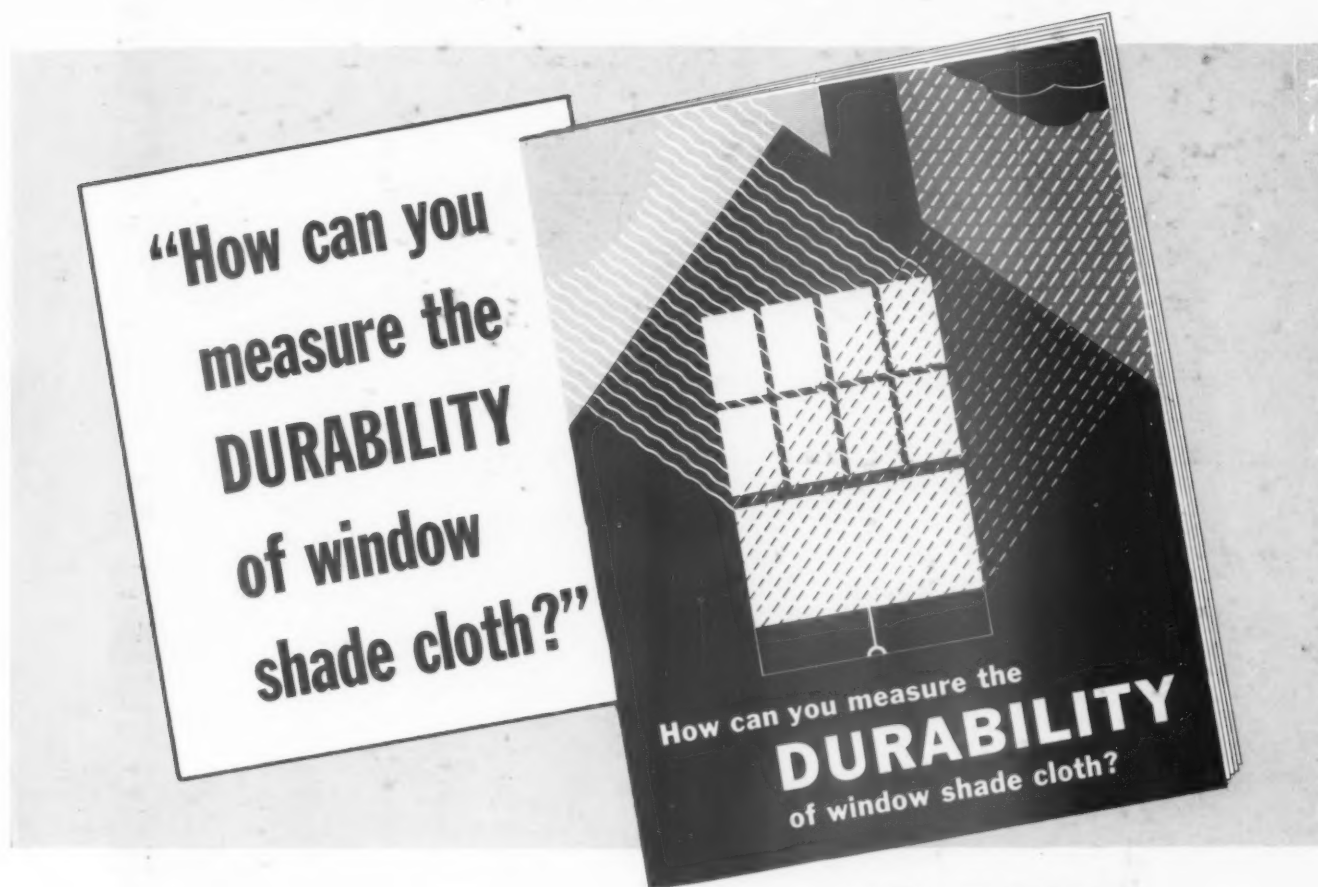


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